FOOD ENGINEERING

May 1951

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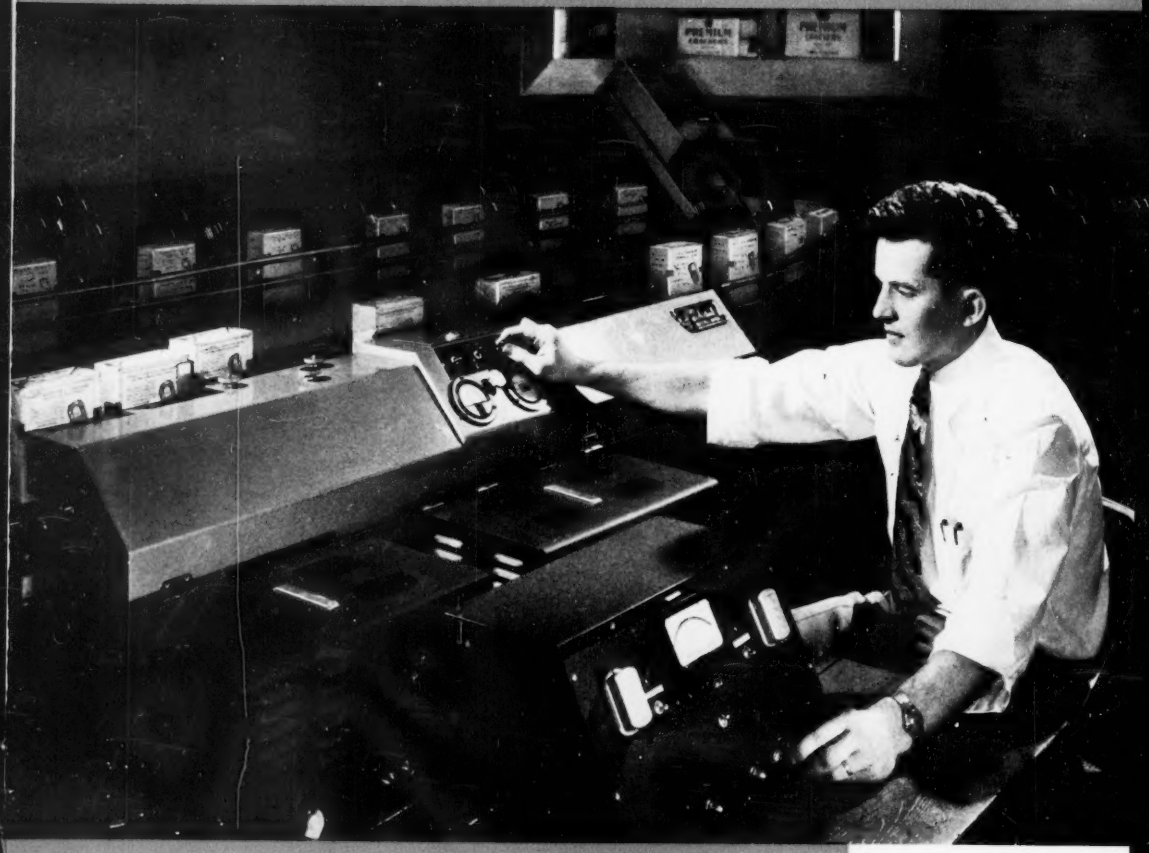

Profit loss through excessive package overfill is avoided by automatic statistical control. (Page 55)

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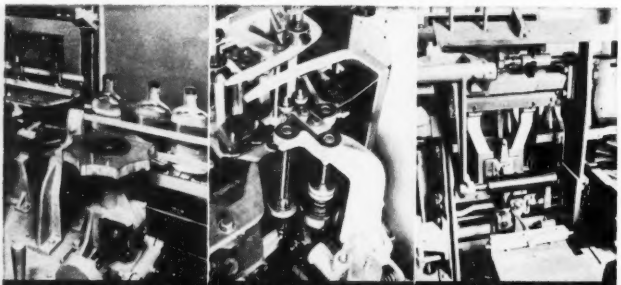

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Food Engineering

Volume 23 MAY, 1951 Number 5

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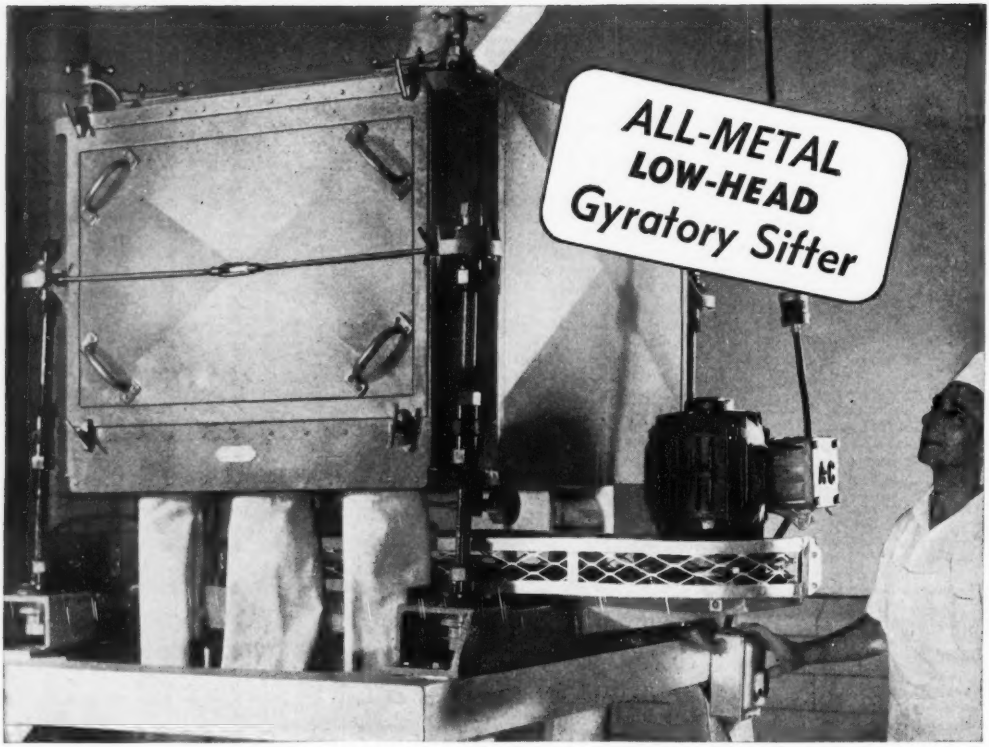

Get Fast SANITARY Sifting

COMPACT!

Low-Head design provides for easy installation . . . needs little floor space.

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Handles flour, sugar, starch, nut meats . . . hot or cold dry products.

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Sifter's high speed operation contributes to large production capacity.

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Made of magnesium and steel for long, dependable operation and easy cleaning.

ALL-METAL MACHINE HELPS INDUSTRY MEET NEW PURE FOOD STANDARDS

HERE'S A NEW gyratory sifter that fits perfectly into the modernization picture of *any* food industry plant. It's the all-metal *Low-Head* sifter — made of steel and magnesium, with silk or wire screens.

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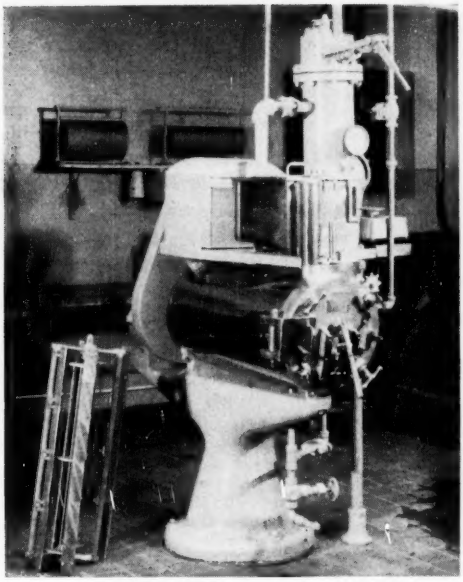
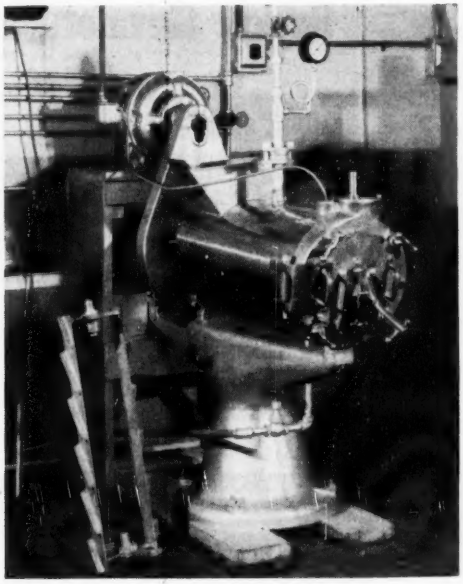
PRACTICAL IDEAS



From ice cream . . .



. . . to cheese

Freezer Converted to Cooker

A small capacity, inexpensive horizontal cheese cooker has now been devised from a direct-expansion ice cream freezer. The conversion was made at the Department of Dairy Industry, Cornell University, Ithaca, N. Y.

Purpose was to more clearly illustrate to the dairy students the modern concept of cheese processing, and also to produce more efficiently a high quality cheese for the dairy sales department.

Here's how the job was done:

The original freezer, a 50-qt.-capacity ice cream unit bought second-hand (left photo above), was stripped of its refrigerant accumulator, mix supply tank and tank support. Its 3-phase, 5-hp. motor was removed from the top of the freezing cylinder and was placed on a separate solid mount directly behind the machine. Having been thus turned around, the direction of rotation of the motor was reversed in order to keep the shaft moving in its original direction. An 8 x 11 in. opening was cut into the top of the cylinder for the insertion of cheese, emulsifier salts and water.

Exposed ends of the cut ammonia jacket were sealed with a steel weld. A small stainless steel hopper with a stainless steel baffle plate guard was inserted in the large opening and properly tinned with lead-tin solder.

The machine was then mounted on a firm base and steam line connections were made with the line that originally had carried ammonia. The scraper blades and beaters were cut off, only ejector blades being allowed to remain.

Process cheese may incorporate too much air under severe agitation conditions. This effect was minimized by removing the blades and beaters and also reducing the speed of the agitator about one-third by replacing the driving sprocket on the motor shaft with one of smaller dia.

The bulb of an indicating wall thermometer was placed directly into the original opening for mix entry. This allowed a direct reading of the cheese temperature at any time during the process. The finished cooker is seen above, right.

Total cost of this machine, including redesigning and installation, did not exceed $250. It requires 4 to 5 min. to fill, 4 to 5 min. at 10 lb. pressure to bring 110 lb. of cheese to 160 deg. F., and about 1 min. to empty. Cheese is placed in the machine only after the cylinder is hot. Normal capacity of this unit would be about 500 lb. of finished cheese per hr.

In addition to the aid it has given students in illustrating cheese processing equipment, this machine appears to possess a number of advantages for small cheese processors. The cooker does not require a grinder for most cheese, since its ejector blades do a very good job of grinding approximately 5 lb. blocks of cheese, which are first cut from large wheels or blocks by a wire cheese cutter. It cooks and empties fast, and since it is not open, consequently retains more of the cheese flavor. It is easy to clean and keep in order. Finally, its operating costs are low.—*Frank V. Kosikowsky, Dept. of Dairy Industry, Cornell University, Ithaca, N. Y.*

What's First In Cleaning Aluminum

Selection of the right type of cleaner is the first and most important consideration when cleaning aluminum.

Strong alkali cleaners, such as lye, soda ash, and trisodium phosphate, discolor and corrode aluminum. A

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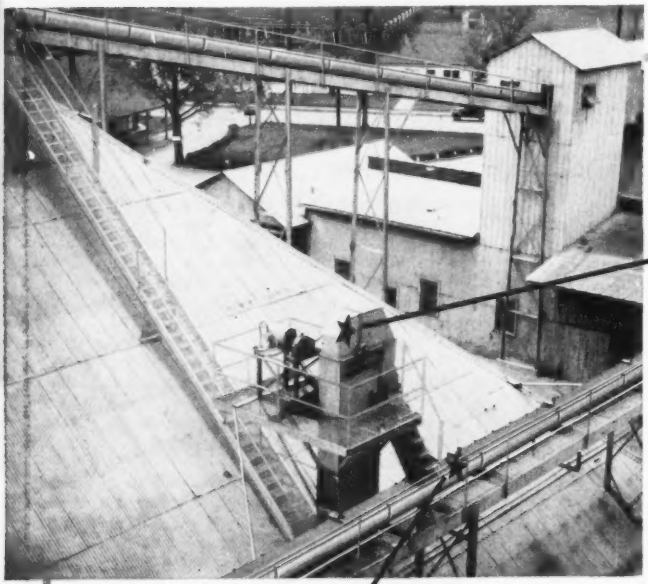
Take advantage of Link-Belt's quality line and materials handling experience. Our engineers will be glad to help you come up with the right answers to your conveying and elevating needs.



Continuous bucket elevator delivers high capacities at lower speeds. Ideal for friable materials.

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Helicoid or sectional conveyor screws—for general screw conveyor applications—may also be furnished in the metal and finish best suited to your purpose and with components selected from the most complete line.

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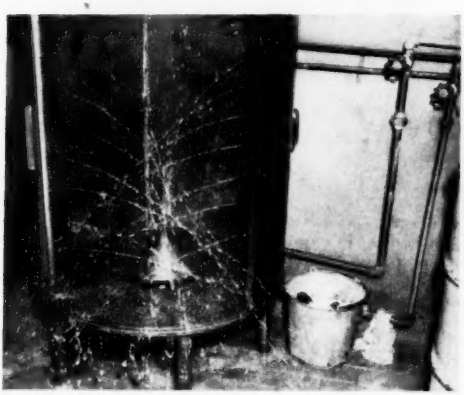
detergent should be used which contains an inhibitor to prevent the attack on metals.

Listed below are several such approved detergents which do a good job of cleaning. None is harmful to aluminum, though it is pointed out that in the case of certain of the detergents (those marked with asterisks) the concentration of the solution should be kept above .25 percent for maximum protection against etching. Below this figure these detergents—due to their composition, and under certain conditions of high temperature and long contact time—might attack aluminum.

1. Clenesco A & T.....Cowles Chemical Co., Cleveland
2. Clenesco Pan Cleaner*..Cowles Chemical Co., Cleveland
3. Diversey PX-220*.....The Diversey Corp., Chicago
4. Diversey PX-22*.....The Diversey Corp., Chicago
5. Divolume*.....The Diversey Corp., Chicago
6. Metso 88.....Philadelphia Quartz Co., Philadelphia
7. Nielco 1926-T.....Nielco Laboratories, Detroit
8. Oakite No. 80....Oakite Products Co., New York City
9. Pan Dandy*.....Economics Laboratory Inc., St. Paul
10. Satinite.....Economics Laboratory, Inc., St. Paul
11. Sprex A. C. Inhibited..DuBois Chemical Co., Cincinnati
12. Terj Inhibited.....DuBois Chemical Co., Cincinnati
13. Wyandotte
    Pama*....Wyandotte Chemicals Corp., Wyandotte
14. Wyandotte
    C.W.*.....Wyandotte Chemicals Corp., Wyandotte
15. Pittsburgh 50% Neutral Soap*
    ...Pittsburgh Chemical Laboratory, Inc., Pittsburgh

In the washing operations, clean hot water should be used. Add detergent, approved for aluminum, in the concentration recommended by the manufacturer. Rinsing should be done with clean hot water at a temperature ranging between 170 to 190 deg. F. Care should be taken to avoid contamination of the rinsing water with the detergent.—*The Aluminum Cooking Utensil Co., New Kensington, Pa.*



Does Fast Barrel-Washing Job

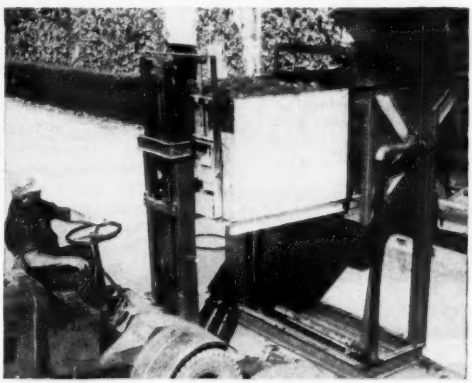
The task of thoroughly cleansing wooden barrels has been simplified and speeded through use of a shop-made washer. It is used in the sausage plant of Anderson & Tarlow Inc., New York City.

Unit is made from salvaged iron stacking. Circular end plates are attached on the top and bottom to form a cylinder. A section of the stacking is then cut to function as a sliding door and a handle attached for ease of operation (see photo). Unit is elevated on pipe legs.

A pipe line, equipped with a spray nozzle, is run through the center of the bottom plate. Vertical perforated pipes are installed at equi-distant points along the interior wall. Perforations are located to direct the streams toward the center of the cylinder.

To wash, barrels are placed in the unit in an inverted position over the bottom nozzle.

Steam at approximately 230 deg. F. is run through both the nozzle and perforated vertical pipes to cleanse both the outside and inside of the barrel. This steam bath is then followed by a cold water wash through the same nozzle and perforated pipes.—*E. A. Anderson, General Manager, Anderson & Tarlow Inc.*



Fork and Tubs Cut Costs One-Third

Steel tubs and a fork lift truck have replaced wooden boxes and a pick-up truck at the wine-grape Mirassou Vineyards near San Jose, Calif. The change-over has

$50 EXTRA FOR BEST ITEM

You are invited to submit Practical Ideas. You will be paid at regular rates when your item is printed and if it is judged best for the month you will get an additional payment of $50.

Selection of the best contributed item will be made by a group of 200 readers each month, and the item title and author's name will be cited (see below).

Practical Ideas may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. They may concern factory, laboratory, warehouse, or power-plant operations in the food industry. Ideas on management, maintenance, and trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit these ideas. The text will be edited and sketches converted to finished drawings.

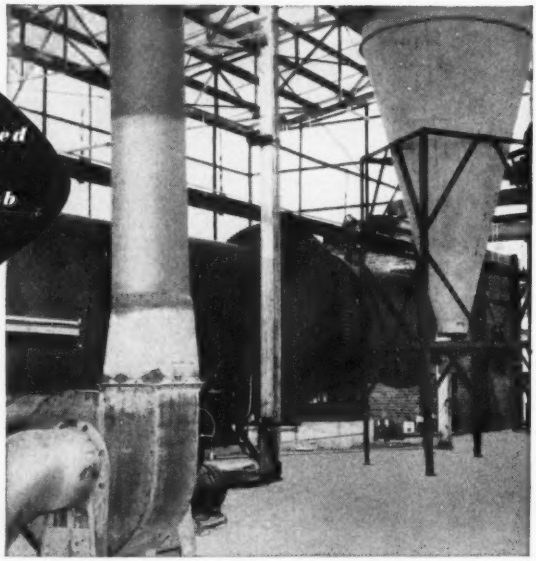
Send your items to: Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 18, N. Y.

MARCH PRACTICAL IDEA voted best was "Microphotos—With Box Camera," submitted by Aloys L. Tapel, University of Minnesota, St. Paul. Described was a technic whereby adequate microphotographs can be obtained with use of a conventional student microscope and simple camera.

See Louisville for

CREATIVE DRYING ENGINEERING

How a new Louisville Dryer can lift production by 4½ times...profits by $11.54 per ton



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FORMER DRYER

Installed cost	$9,000.00
Annual production (tons)	450
Drying cost per ton	$18.60
Capacity, lbs. dried product per hour	600

LOUISVILLE DRYER

Installed cost	$36,000.00
Annual production (tons)	2,025
Drying cost per ton	$7.06
Capacity, lbs. dried product per hour	3,500

EXTRA PROFIT PER TON DRIED WITH LOUISVILLE DRYER $11.54

Don't call in a "boy"—when the job is man-size! Small-production dryers *can* cost you big money—as the performance comparison figures shown here prove clearly. Here's black-and-white proof that it pays to have a Louisville engineer check over your dryer capacity.

A study of your problem may show that a larger-capacity Louisville dryer—especially designed for your purpose—will turn out 4½ times more production—with little if any increase in your labor costs. In fact, labor savings alone may spell the difference between a good profit or a sagging loss.

Find out what a specially designed Louisville dryer—with output pretested in our own unique laboratory and pilot plant—will do for you. Ask for a Louisville survey of your problem. There is no obligation.

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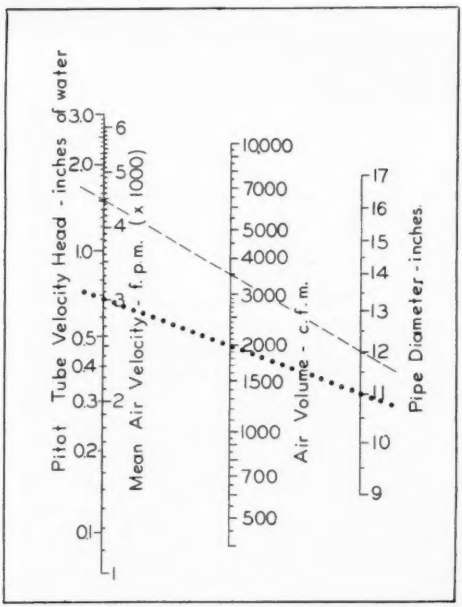
brought increased efficiency and is estimated to have cut costs one-third.

The new plastic-lined tubs, holding about 1 ton of grapes, are field-filled by pickers with hand buckets. The special plastic material protects the grapes from the metal, also keeps the steel safe from corrosion by fruit acids.

The fork lift truck picks up the tubs, hauls them to the winery crusher, dumps the grapes, and returns the tubs to the field.

Savings accrue from elimination of wooden box replacement (about 1,000 a year at 60c each) and from using the fork truck for tub lifting and dumping power instead of resorting to other machines. Labor savings are considerable since time-consuming hand loading in the vineyard and dumping at the crusher are eliminated.

About a score of the new steel tubs were in use at Mirassou Vineyards at the end of the 1950 season.



Simplifies Air-Duct Calculations

If you are ever up against the job of figuring the size of ducts for air-flow in heating and ventilating systems and air-volume in the ducts of piping systems of fans and blowers, use of the above nomograph will make your task easier.

How to use the graph is indicated by the examples scribed thereon.

In the first problem, the mean velocity and volume of air is to be determined in a 12-in. I.D. duct in which a Pitot tube velocity-head reading of 1.5 in. of water has been taken at the center of the duct. The value of 1.5 in. of water on the "Pitot Tube Velocity Head" scale (left side of first column on the graph) corresponds to a mean velocity of 4,460 ft. per min. read on the "Mean Air Velocity" scale (right side of first column).

As indicated by dash line on the graph, a straight edge connecting 1.5 on "Pitot Tube" scale (first column) and 12 on "Pipe Diameter" scale (third column) intersects the "Air Volume" scale (center column) to give the answer as 3,500 cfm.

In the second example, assume that it is necessary that an air conveyor have a velocity of 3,000 ft. per min. for an air volume of 2,000 cfm. Problem: Determine the proper duct size.

A straight edge (dotted line) connecting 3,000 on the "Mean Air Velocity" scale (first column, right) with 2,000 on the "Air Volume" scale (center column) intersects the "Pipe Diameter" scale (third column) at 11 in. In short, a duct of 11-in. I.D. is required.

The nomograph was developed as follows:

With Pitot tubes the most satisfactory devices for measurement of air in large volumes, flow of air in cubic feet per minute may be calculated from the velocity-head readings of a Pitot tube by means of the formula.

$$V = 1{,}096.2\ C\ h^{\frac{1}{2}} \qquad (1)$$

wherein V = velocity of air in ft. per min.
h = Pitot tube velocity-head, in. of water
$C = W^{-\frac{1}{2}}$, W being the weight of 1 cu. ft. of air.

For approximate calculations, if the air density is taken as 0.075 lb. per cu. ft. (density for air temperature of 70 deg. F, 70 percent relative humidity at 30 in. of mercury), then C in equation (1) becomes 3.67. Since the mean velocity for the total area of the duct is 91 percent of the velocity at the center, then equation (1) may be modified to

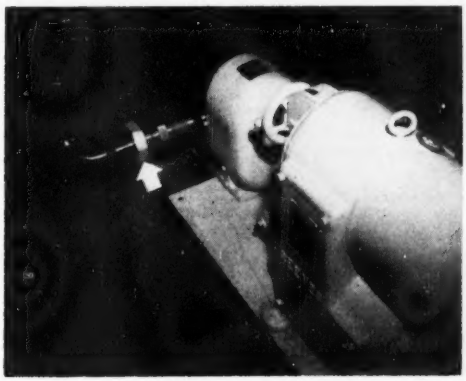
$$V = 3{,}650\ h^{\frac{1}{2}} \qquad (2)$$

wherein V = mean velocity of air in ft. per min.
h = Pitot tube velocity-head at the center of the duct, in in. of water.

The velocity of the air in the duct or pipe as determined by equation (1) multiplied by the cross-sectional area (A) of the duct or pipe in sq. ft. yields the volume (Q) of air in cu. ft. per min. The nomograph is then based on the equation

$$Q = 3{,}650\ A\ h^{\frac{1}{2}} \qquad (3)$$

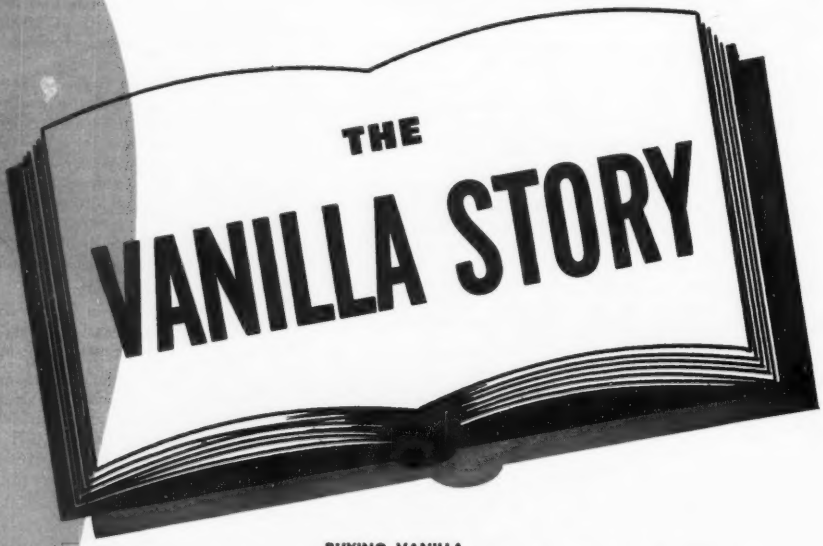
The mean velocity of air in a duct corresponding to a given velocity-head reading of the Pitot tube taken at the center of the duct is given by the alignment scale at the left of the nomograph.—*Joseph T. Hogan, Chemical Engineer, 2713 No. Roman St., New Orleans, La.*



Check Valve Improves Pumping

In our operations at Nedick's, installation of a check valve in the product line, on the discharge side of the pump, greatly improved pumping of liquid from a vacuum deaerator.

When a vacuum deaerator is sufficiently elevated above



BUYING VANILLA
IS A CONFUSING JOB AND KNOWING WHAT YOU'RE GETTING IS EVEN MORE DIFFICULT.

Here's the Reason

The finest flavor is that of an old fashioned, leisurely extract of the best Mexican or Bourbon beans. Due to yield and time required, such extracts are seldom seen in today's market. To meet practical price requirements, economies are used, such as speedier and exhaustive extractions, cheaper grades and powdered beans . . . then for further savings, the imitations, using vanillin, other aromatics and even coumarin. Each has its flavor value yet each step carries flavor farther from true vanilla. In trying any vanilla, pure or imitation, compare it to the finest pure extract. Get the best you can afford.

ALVA can supply the finest as well as every other practical grade of vanilla for every use, honestly priced and honestly labeled. Here are a few:

- Pure Vanilla Extracts, single strength, 2, 4 and 10 fold
- Oleo Resin Pure Vanillas
- Imitation Vanillas
- **ALVANYA** (imit. vanilla absolute) duplicating the aromatic portion of the bean itself. Excellent when used alone or to improve any commercial vanilla at a saving. Extreme temperature stability.
- Vanilla sugars, pure and imitation.

Tell us what you want and we will send you the best vanilla to meet your requirements.

VAN AMERINGEN-HAEBLER, INC.
521 WEST 57th STREET, NEW YORK 19, N. Y.

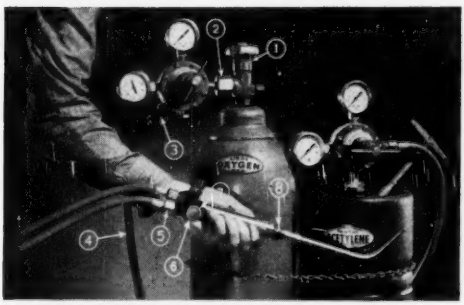
Alva FLAVORS

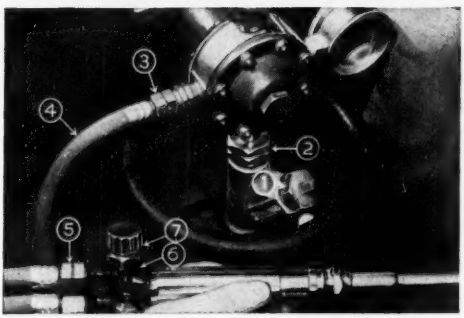
the pump that draws the liquid from the unit, then the problem of pumping out against the existing vacuum is minimized. But, when it is necessary to install the pump at discharge level, pumping against the vacuum in the deaerator may be a very real problem.

We were faced with the latter situation, and though we got better operations by a change to a more efficient pump, our unit was still unable to function satisfactorily against a vacuum of 22-24 in.

But why not install check valves on the pressure side of pumps on all lines leading from vacuum equipment? We tried it—and it did the job.

No doubt there will be others confronted with this same problem. They, too, can solve it easily with an efficient check valve (see illustration) installed close to the pump on the discharge side.—*E. F. Hansen, Production Manager, Nedick's Inc., New York City.*





Nip Those Welding Tool Leaks

It pays—both in safety and in dollars—to regularly test for leaks in your oxygen-acetylene gas welding and cutting equipment. Leaks in this equipment are a hazard to you, to your shop, and to your equipment. And the losses of gases can run into considerable money.

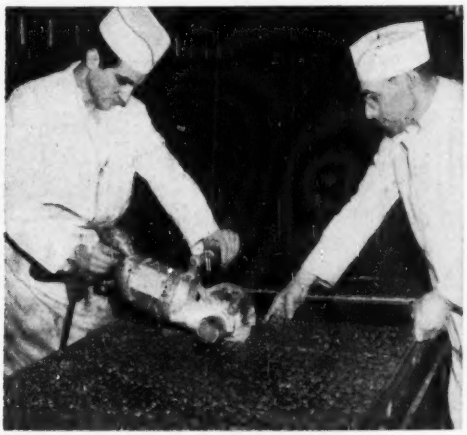
Loose connections cause most leaks. Usually, the remedy is a simple tightening of the connections. And when a leak is found that cannot be thus stopped, shut off the supply of gases and replace the defective part. Poor connections are not worth the risk.

Four simple items—a clean paint brush, cloth, pail of water, and a cake of grease-free soap, such as Ivory, to make a soapy mixture water—comprise the necessary testing equipment.

To test the oxygen system, close the acetylene cylinder valve and release all the acetylene from the regulator, hose, and blowpipe. Next, disconnect the acetylene hose from the blowpipe and close the blowpipe acetylene valve. Now turn on the oxygen to a few pounds pressure, and place your thumb over the blowpipe tip to stop the flow. With the flow choked, apply soapy water to the eight places marked in the upper photo, then bubbles will indicate a leak.

To test the acetylene system, close the oxygen cylinder valve and release all the oxygen from the regulator, hose, and blowpipe. Then disconnect the oxygen hose from the blowpipe and close the blowpipe oxygen valve. Turn on the acetylene and soap-test the places marked in the lower photo in the same manner as you did the oxygen system.

Hose should be tested by immersing in a bucket of water and again checking for bubbles.—*Based upon item in "Tips", house organ of The Linde Air Products Co., New York City.*



Electric Saw Cuts Candy Bars Fast

Slab-cooled bar candy is being cut four times quicker by a simply modified portable electric saw at the Walter H. Johnson Candy Co., Chicago.

Formerly, slab cutting was a tedious manual task. A husky man, equipped with a long butcher knife, would laboriously make his way down each slab, harried by the speedy cooling of batches. This operation was considered a bottleneck in the well mechanized bar line.

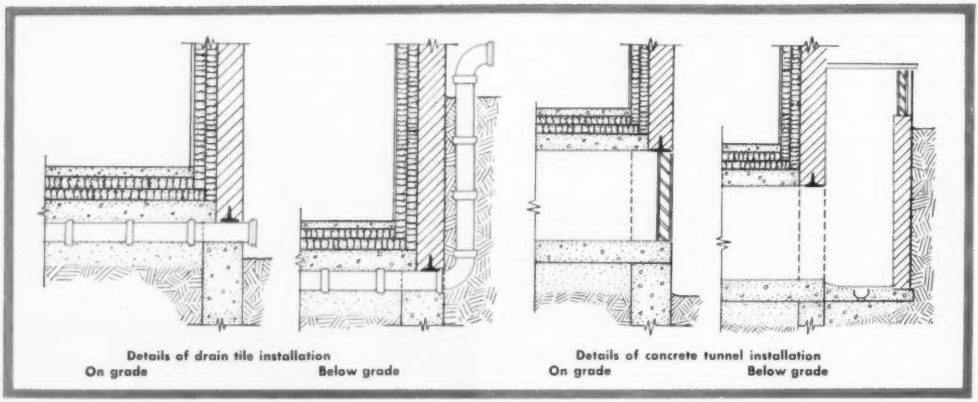
The problem was licked by an ingenious modification of a spare electric saw in the machine shop. A plow was added to guide the saw under the candy and prevent blade contact with the metal cooling slab. The wood saw, with its erratic cutting teeth, was replaced by a smooth edge, circular blade.

It was soon noted that while this new rig did the job, build-up of candy on the blade guard caused the unit to clog and become ineffective. This was neatly dealt with by reversing the wiring of the electric motor. The blade now rotates clockwise, in contrast to the counterclockwise movement employed in wood cutting and necessary for sawdust removal.

The blade now moves smoothly through the candy with no clogging or splattering of the operator.

With this simple new tool, one man is now cutting a candy slab 48 ft. long and 36 in. wide in less than 3-min. The work calls for a broadside cut every 36 in. and one long 48 ft. slice bisecting the slab.

Not only does the operator accomplish his job four times faster, but his work is more even and smoother. And now the plant doesn't have to rob the wrestling profession to get a man to do this chore.—*Sam J. Mando, Production Engineer, Walter H. Johnson Candy Co., Chicago.*



Details of drain tile installation
On grade Below grade

Details of concrete tunnel installation
On grade Below grade

We have been asked . . .

"Is there danger of frost forming in the ground under a large, on-grade freezer?"

"I plan to build an additional hardening room on grade," writes an ice cream manufacturer. "Dimensions are to be 60′ x 80′. Will the 20° to 30° F. below zero temperatures of my room freeze the ground below it?"

HERE'S THE ANSWER:

It is quite common for frost to form under a large, on-grade freezer. What happens is that the heat is drawn out of the earth and through the floor faster than it can be replaced by outside heat flow into the ground at the edges of the building. The ground beneath the subfloor freezes and expands, exerting pressures that will buckle the floor and eventually cause complete failure of the room. The length of time required for damage to occur will depend upon soil conditions, quality of insulation, and general construction.

No practical amount of insulation can prevent heat from flowing from the subsoil through the floor, and consequent lowering of earth temperature. Insulating materials retard rather than prevent heat passage.

To prevent frost damage, the soil under freezer rooms built on grade or below grade should be ventilated with air ducts spaced at regular intervals in a cinder or crushed stone fill under the subfloor. The ducts can be 6″ or 8″ drain tile on 6′ centers, or 2′ x 3′ concrete tunnels on 16′ centers. Both types should be laid across the short dimension of the room to provide for maximum circulation of air. The opening at one end should be lower than the other to create a draft, introducing sufficient warm air to keep ground temperatures above freezing and prevent formation of frost. When on- or below-grade freezer rooms are 20′ x 20′ or less in dimension, the ventilating system under the subfloor can usually be omitted. Armstrong engineers will be glad to advise you on the best method of guarding against frost formation under freezer floors. Ask their advice while your job is in the design stage. A call to your nearest Armstrong office at that time may save you future trouble and the needless expense of rebuilding a low-temperature room that has been ruined by frost.

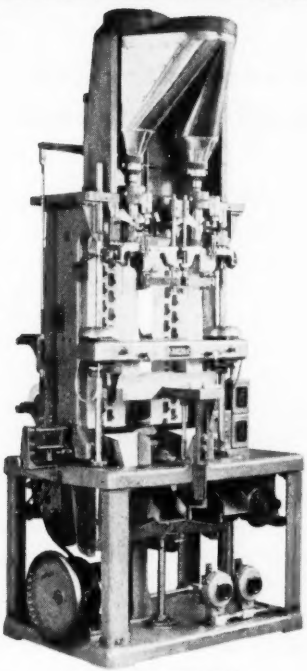
SEND US YOUR QUESTIONS: If you have any questions on the construction of low-temperature facilities, please do not hesitate to write to us. We'll see that you get a practical answer. Just address a letter or post card to Armstrong Cork Company, 2305 Concord Street, Lancaster, Pa.

ARMSTRONG'S INDUSTRIAL INSULATIONS

MATERIALS - INSTALLATION

FOR ALL TEMPERATURES FROM 300°F. BELOW ZERO TO 2800°F.

COFFEE PACKAGES by STOKESWRAP



MODEL BS STOKESWRAP
AUTOMATIC PACKAGING MACHINE

Exclusive West Coast Distributor:
Anderson-Barngrover Division of FMC
San Jose 5, California

UP TO 8 OZ. CAPACITY

Just imagine being able to fill any size package up to 8 ounces . . . at a speed of 3000 per hour with one operator! Yes . . . it can be done on the improved Model BS STOKES-WRAP. Using printed or unprinted cellophane, pliofilm, pouch paper or other heat sealing films, special equipment can be supplied to gas the product with carbon dioxide when desired. The machine automatically forms the package, fills and heat seals at the one operation up to 3000 or more per hour, depending upon the size of the package. Either auger or centrifugal feed may be used — wire, phone or write for full particulars.

A PARTIAL LIST OF USERS OF STOKESWRAP MACHINES FOR SILEX COFFEE

Ben Hur Products Inc.
Cain's Coffee Company
Closset Devers
Colonial Coffee Co.
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Duncan Coffee Co.
Edmands Coffee Co.
General Foods—Maxwell House Division
Hill Bros-Stephens Inc.
King Coffee Co.
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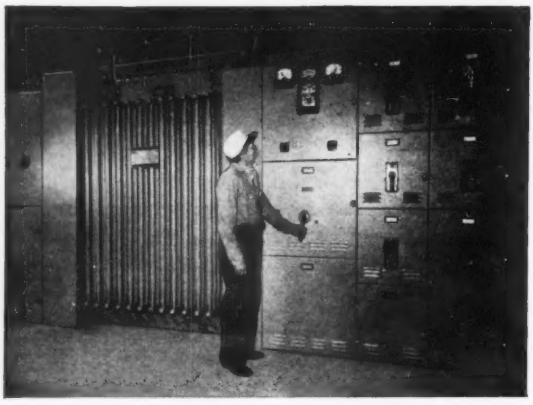
STOKES & SMITH Co
PACKAGING MACHINERY — PAPER BOX MACHINERY

Subsidiary of Food Machinery and Chemical Corporation

4911 Summerdale Ave., Philadelphia 24, U. S. A.

MODERNIZED POWER SYSTEMS provide production continuity

Food processors keep abreast of plant expansions with co-ordinated General Electric power distribution systems

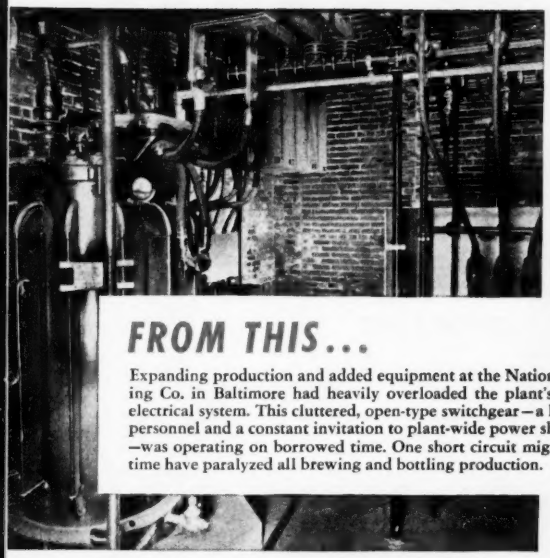


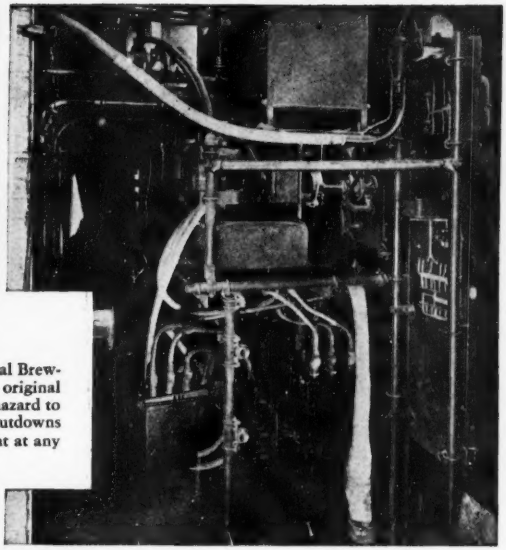
G-E load-center unit substations, factory-assembled and wired, are quickly, inexpensively installed. This 750-kva unit is in the St. Joseph, Mo. plant of the Quaker Oats Co.

America's growing appetite has made its food industry fourth largest in use of electric energy. But expansion in many food plants has left the electrical system lagging behind. If stepped-up loads in *your* plant are still being met with obsolete equipment and makeshift circuit arrangements, ask your G-E representative about installing a modern co-ordinated G-E system—safer, cleaner, easier to maintain, and with greater capacity to meet future growth. Meanwhile, send for Bulletin GEA-3592 on G-E load-center unit substations, and ask to see G-E's "More Power to America" color sound slidefilm, "Modern Industrial Power Distribution." *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

652-8





FROM THIS...

Expanding production and added equipment at the National Brewing Co. in Baltimore had heavily overloaded the plant's original electrical system. This cluttered, open-type switchgear—a hazard to personnel and a constant invitation to plant-wide power shutdowns—was operating on borrowed time. One short circuit might at any time have paralyzed all brewing and bottling production.

...TO THIS!

Recently all this was replaced by modern G-E metal-clad switchgear (right) for the incoming and outgoing 13.8-kv feeders, with draw-out type circuit breakers providing a safe margin against short-circuit damage. From the switchgear, power flows to the 1500-kva G-E load-center unit substation (left), which steps down voltage for use at plant motors. Now workers are protected against contact with live parts, and valuable floor space is saved.

GE

POWER DISTRIBUTION SYSTEMS

for food plants

GLYCERINE

IMPORTANT FOR FOODS...

...IMPERATIVE FOR NATIONAL DEFENSE!

Important? "Indispensable" is a better word for U.S.P. Glycerine! Nutritious and easily digested, it serves equally well as solvent...sweetener...humectant...softener...and preservative in hundreds of food products!

That's part of the reason why Glycerine is now one of the first 6 chemicals under inventory control*... So if you find it a "hard-to-get" item these days—remember, Glycerine is doing double duty on our own dining tables and in energy-producing combat rations, as well as a host of other military applications!

*By Government authorities responsible for inventory control under the National Defense Act.

GLYCERINE PRODUCERS' ASSOCIATION
295 Madison Ave., New York 17, N. Y.

MASTROL SYSTEM for Forced Hot Water Heating

No. 11 Self Operating Regulators

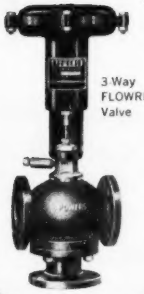
PNEUMATIC CONTROLS

Thermostat

Hygrostat

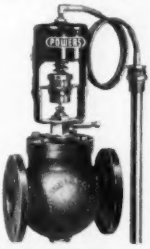
Radiator Valves

Packless Valves Available



3 Way FLOWRITE Valve

PNEUMATIC CONTROLS



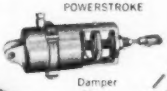
FLOWRITE Diaphragm Valve

AIRSTREAM Thermostat

Pneumatic Switches

ACCRITEM REGULATOR
Compressed Air or Water Operated

POWERSTROKE



Damper Motor

FLOWRITE Valve

METAFLOW Valve
Available Packless

POWERS

TEMPERATURE and HUMIDITY CONTROL

For Heating and Air Conditioning Systems Industrial Processes

Water Heaters • Heat Exchangers Jacket Water Cooling

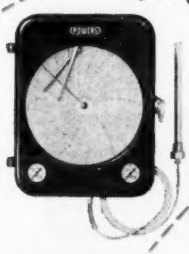
All Types of Baths Hospital Hydrotherapy

Most of your control problems can be solved sucessfully with the aid of a POWERS engineer and the proper application of some of our modern products. Why not profit from our 60 years of experience? There's no obligation. Phone or write our nearest office.

Series 100 Pneumatic Indicating Regulator

Pneumatic

Right: Static Pressure Regulator



Left: Series 100 Recording Regulator

Self-Operating

Thermostatic Water Mixers

THE POWERS REGULATOR CO.

Established 1891 • Offices in Over 50 Cities • See Your Phone Book

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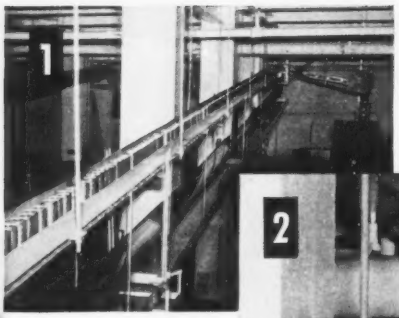
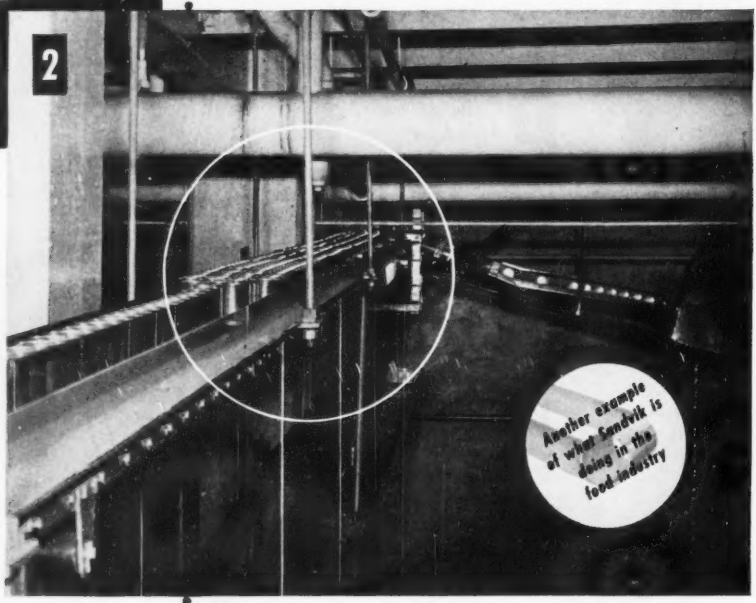
TORONTO, ONTARIO • 195 Spadina Avenue
MEXICO, D. F. • Edificio "La National" 601

Easier-Sliding Simplifies Can Handling On This SANDVIK STEEL-BELT CONVEYOR





SS-71

Can You Improve Your Food Handling Operation With A Sandvik Steel-Belt Conveyor?

In addition to can conveyors, Sandvik supplies steel-belt units for handling a wide variety of foods, in various stages of preparation. These include meat, fish, vegetables, fruits, sugar, bakery products (on bake oven bands), margarine, candy, etc.

Why not look over your operation. See if there might be a place where the easy-to-keep sterile surface of a solid, stainless or carbon steel band could save money or step up production. Then, ask Sandvik for their engineering help and advice.

Sandvik builds complete conveyors to fit specific applications and provides engineering service to insure satisfactory operation. Belts can be of any length or width.

Write, wire or phone for further information.

SANDVIK STEEL, INC.

Conveyor Division

111 EIGHTH AVE., N. Y. 11, N. Y., WAtkins 9-7180

Manufacturers of steel-belt conveyors for over thirty years.

1 Here are cans of Hershey's chocolate syrup carried by a Sandvik steel-belt conveyor. Normally, they move in single file to the take-off point.

2 But, when there's a delay . . . the cans keep coming, close ranks, form a column of four and mark time . . . with the smooth, Sandvik belt sliding easily under them until the take-off operation catches up. At times, there are four can columns, 60 feet long, marking time on the moving belt.

The smooth, low-friction surface of the solid steel band gives a Sandvik conveyor a special advantage for handling cans. They can be very easily slide-handled as they ride on the moving belt. This facilitates automatic storage en route and simple, slide-off discharge at any point with a minimum of belt wear. When extra "slide-ability" is required, the surface of the band can be lubricated.

SANDVIK STEEL BELT CONVEYORS

important announcement

MM&R SPICE ESSENTIAL OILS

will be known as

MAGNA *Spice* CONCENTROLS

It's not the new name that's important...
It's the fact that this new trade-mark identifies

THE METHOD THAT HAS

CUT SEASONING COSTS 20%-40%

FOR HUNDREDS OF FOOD PROCESSORS!

YES, *hundreds* of meat packers and other food processors, *small, medium and large*, have PROVED that the MM&R method makes it possible to rack up savings of 20%-40% and *more*... year after year! PROVED that because MAGNA Spice CONCENTROLS are highly concentrated pure seasoning all the way through, seasoning cost per batch is lower! PROVED that with less bulk, MAGNA Spice CONCENTROLS provide greater economy in shipping, storing, handling. And, most important, PROVED that the MM&R method of *carrier-free* seasoning gives complete *in-plant* control of uniformity!

You can obtain *all* these advantages *without* changing the flavor of your products. Let the MM&R Food Technology Dept. duplicate your present spice formulae *precisely*—with a guaranteed saving of 20%-40%. Inquire today.

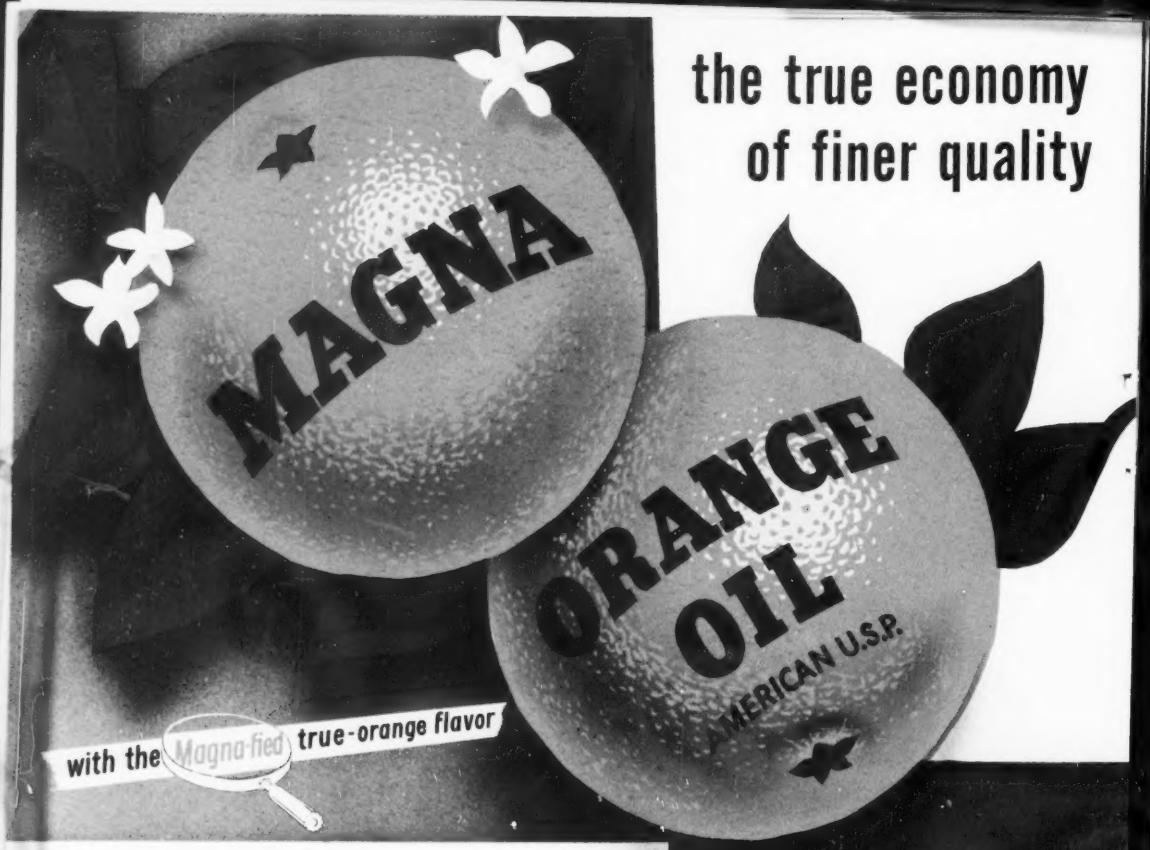
MAGNUS, MABEE & REYNARD, INC.

SINCE 1895... ONE OF THE WORLD'S GREATEST SUPPLIERS OF ESSENTIAL OILS

16 DESBROSSES STREET, NEW YORK 13, N.Y. • 221 NORTH LASALLE STREET, CHICAGO 1, ILL.

LOS ANGELES: BRAUN CORP. • SEATTLE, PORTLAND, SPOKANE: VAN WATERS & ROGERS, INC.
SAN FRANCISCO: BRAUN-KNECHT-HEIMANN CO.

• T.M. REG. APPLIED FOR



the true economy of finer quality

MADE THE NEW MAGNA-WAY TO GIVE YOU MORE IN FLAVOR VALUE!

MAKE this cost-cutting discovery for yourself! Your *quality* buy is your *best* buy – because you know you're guarding the integrity and sales appeal of your product. That's why more manufacturers every day are switching to *one* brand, more than any other on the market – MAGNA ORANGE OIL!

The Magna process brings you more intense, true-orange flavor per pound. That's *real* economy.

But that's not all! With prices for all other ingredients at the highest levels in years, you'll be delighted to find that MAGNA ORANGE OIL is not only the *best*, but probably the most *inexpensive* quality oil you can buy. Try it! Write for Schedule of Prices today!

investigate these great **MAGNA CITRUS OILS**

All made the Magna-way to give you more flavor-goodness for your money!

MAGNA LEMON OIL (Amer. U.S.P.)
MAGNA LIME OIL (Exp. or Dist.)
MAGNA GRAPEFRUIT OIL (Exp. Amer.)
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SINCE 1895 . . . ONE OF THE WORLD'S GREATEST SUPPLIERS OF ESSENTIAL OILS

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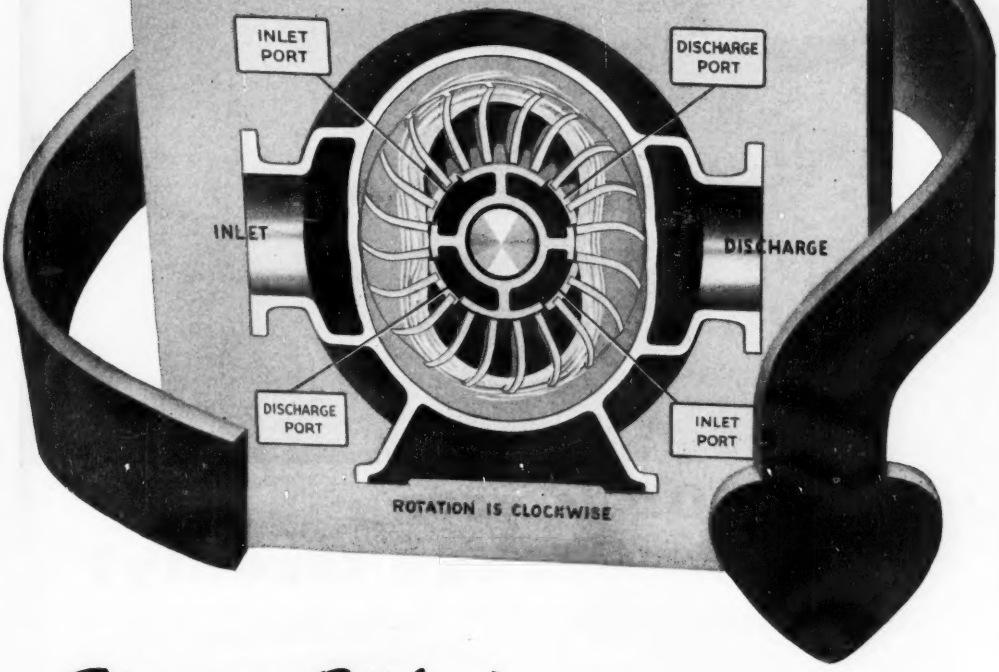
LOS ANGELES: BRAUN CORP., SEATTLE, PORTLAND, SPOKANE: VAN WATERS & ROGERS, INC.
SAN FRANCISCO: BRAUN-KNECHT-HEIMANN CO.

Nash Instrument Air Compressors deliver only clean air, free from oil or dust, and without filters



Here is Why!

You can dispense with oil filters and dust filters when you install ®Nash® Clean Air Compressors. You can save the cost of maintaining these devices. You can greatly reduce instrument maintenance costs. For the Nash employs no internal lubrication, therefore no troublesome oil is in the delivered air. Moreover, air from a Nash is thoroughly washed and cooled as it passes thru the pump. Dust in the plant atmosphere, even fly ash, is immediately removed.

®Nash® Clean Air Compressors are simple, with only one moving element. No valves, gears, pistons, sliding vanes, or other enemies of long life and constant performance complicate a Nash. No aftercoolers are needed. You will find it profitable to investigate these pumps, now.

No oil filters.
No dust filters.
No internal lubrication to contaminate air handled.
No internal wearing parts.
No valves, pistons, or vanes.
Non-pulsating pressure.
Original performance constant over a long pump life.
Low maintenance cost.

NASH ENGINEERING COMPANY
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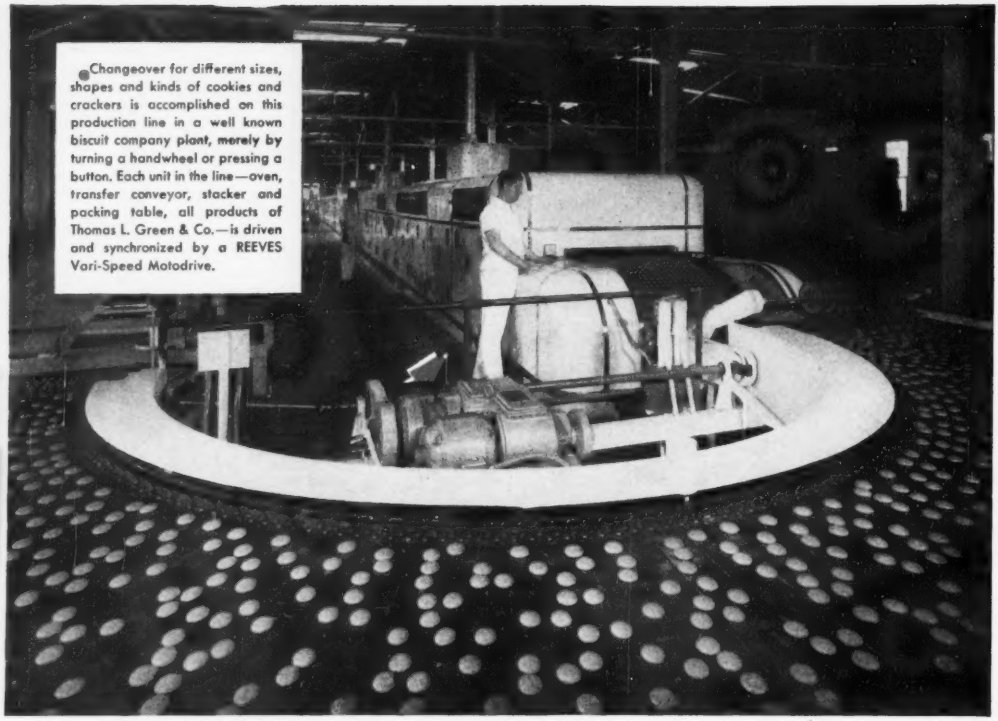
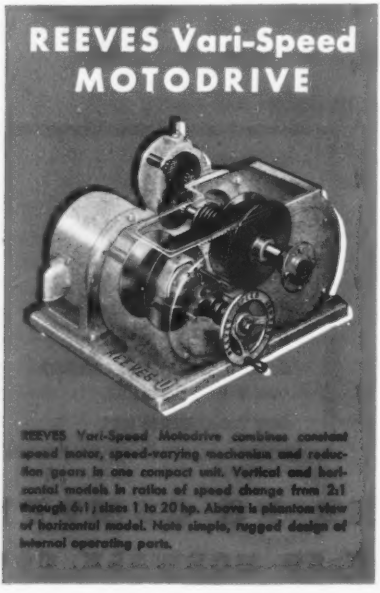


Changeover for different sizes, shapes and kinds of cookies and crackers is accomplished on this production line in a well known biscuit company plant, merely by turning a handwheel or pressing a button. Each unit in the line—oven, transfer conveyor, stacker and packing table, all products of Thomas L. Green & Co.—is driven and synchronized by a REEVES Vari-Speed Motodrive.

How GOOD is your CHANGEOVER capacity?



REEVES Vari-Speed Motodrive combines constant speed motor, speed-varying mechanism and reduction gears in one compact unit. Vertical and horizontal models in ratios of speed change from 2:1 through 6:1; sizes 1 to 20 hp. Above is phantom view of horizontal model. Note simple, rugged design of internal operating parts.

Can you change your production lines from one type of product to another, merely by turning a handwheel or pressing a button, as in the example above? Can you handle a wide variety of shapes, sizes, ingredients on the same machines without dependence on skilled operators? . . . You can meet all these conditions—and *more*—with machines that have smooth, accurate speed adjustability as provided by REEVES Variable Speed Drives. You can speed up or slow down machines speeds exactly as needed—even to a fraction of an rpm—to regulate mixing, cooling, heating time; match number and skill of operators; allow for peak and slack production periods; compensate for every changing condition in your processing. REEVES drives are standard equipment on most leading makes of food machinery. Easy to install on machines in service. Learn how you can profit by REEVES Speed Control. Write for helpful bulletin No. FD 59-3N.

REEVES PULLEY COMPANY • Columbus, Indiana

Recognized Leader in the Specialized Field of Speed Control Engineering

accurate · variable
REEVES *Speed Control*

CORROSION NOW POSES A DOUBLE THREAT

Worn out and corroded equipment may not be replaceable

Don't take chances on vital equipment. Scarce metals and materials are becoming scarcer. Farsighted business men are rebuilding, repairing and *protecting* to insure continuity of their operations.

Do these two things today:

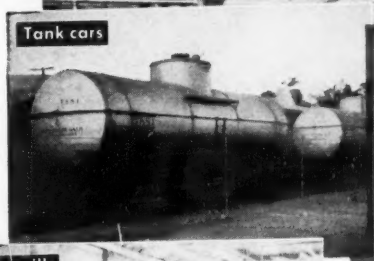
1. Check up in your plant—manufacturing equipment, piping, valves, tanks, motors, and all similar items.
2. Arrange to protect them with Amercoat—the corrosion-resistant coatings; each designed to meet specialized conditions.

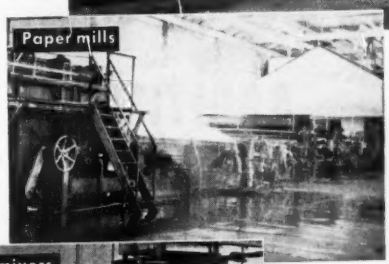
Note: Most conventional coatings fail under severe service conditions. They are neither designed nor suitable for such applications.

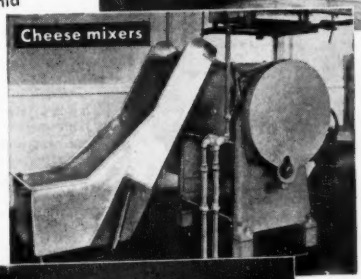
AMERCOAT CORPORATION

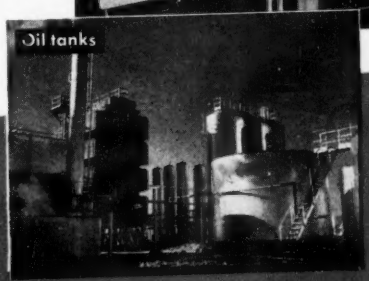
A Division of American Pipe and Construction Co.
4809 Firestone Blvd., South Gate, California

FOLLOW THE LINE OF *most* RESISTANCE









Doesn't Your Business DESERVE the BEST in Sanitizing Agents?

The ORIGINAL Quaternary Ammonium Germicide

Laboratory tested and controlled
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This Control No. Guarantees
POTENCY
UNIFORMITY
QUALITY

INSIST ON GENUINE Roccal

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SANITIZING AGENT

to do a more effective sanitizing job throughout your plant!

Petri dish showing colonies of bacteria before the use of ROCCAL.

Petri dish showing no bacterial growth after the use of ROCCAL.

In the Food Industry, the importance of using only the best in sanitizing methods cannot be over-emphasized.

In Roccal, the *original* quaternary ammonium germicide, the food industry is offered a sanitizing agent that is laboratory controlled and tested. The uniform quality of Roccal means uniformly good results in doing a proper sanitizing job.

Roccal is a powerful germicide. In recommended dilutions, it is non-poisonous, non-irritating to the skin, virtually odorless and tasteless.

Roccal can be used for every sanitizing job in processing and packaging in the following food industries: milk, cream, ice cream, butter, cheese, egg breaking, sugar, fish, poultry, fresh frozen vegetables and fruits, meat products, cereal products, candy and beverage, wherever the product comes in contact with equipment. Also to keep walls and floors sanitary.

USES IN FOOD INDUSTRY

To Sanitize:

- STORAGE BINS
- FREEZING UNITS
- REFRIGERATORS
- CONVEYORS
- TANKS
- PROCESSING EQUIPMENT
- PACKAGING EQUIPMENT
- AIR CONDITIONING AND COOLING SYSTEMS
- WALLS AND FLOORS
- WASH ROOMS
- TRUCKS
- AND AS A HAND RINSE FOR HELP

Our Technical Service Department stands ready at all times to answer your questions about specific uses for ROCCAL

START USING ROCCAL TODAY—
you'll find that better sanitation is good business.

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First choice for choice cuts: meat saw on TIMKEN® bearings

WHEN the Toledo Scale Company designed their Model 5200 Power Meat Saw, they wanted a saw that would be No. 1 choice among meat cutters, butchers and wholesalers. It had to have ample capacity for breaking up wholesale cuts as well as precise cutting for producing uniform and attractive steaks, chops and roasts.

So they mounted the upper and lower pulley shafts on Timken® tapered roller bearings. They knew that Timken bearings would reduce friction under the load of large cuts, keep pulley shafts in alignment for meat-cutting accuracy, and give long, trouble-free service for the life of the saw.

Timken bearings keep shafts in positive alignment, so that original blade precision is maintained. Wear on moving parts is minimized, reducing the risk of breakdown and maintenance. Tapered construction enables Timken bearings to carry radial and thrust loads in any combination.

Line contact between rollers and races gives extra load-carrying capacity. True rolling motion and an incredibly smooth surface finish makes friction negligible. And tight, lubricant-retaining closures keep dirt and moisture out, keep the lubricant in—eliminating the possibility of meat contamination.

No other bearings add so much value to a machine as do Timken tapered roller bearings. Specify them in the machines you build; look for them in the machines you buy. The trade-mark "Timken" on every bearing is a mark of value. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

Here's how the **TOLEDO SCALE CO.** *mounts the upper and lower pulley shafts on Timken bearings to insure precision meat cutting, maintenance-free performance.*

FINISHED TO CLOSER TOLERANCES

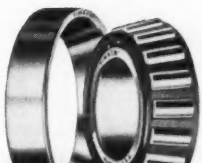
Finishing to incredible smoothness accounts for much of the precise, smooth rolling performance of Timken bearings. This honing operation is typical of the amazingly accurate manufacturing methods at the Timken Company.

The Timken Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

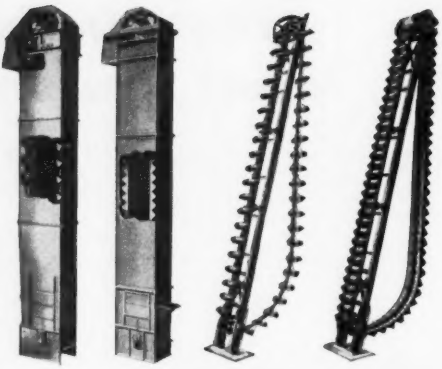


NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION ✳

Partial List of

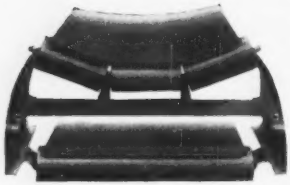
WHAT WE MAKE

TO HELP YOU IN YOUR HANDLING AND PROCESSING OPERATIONS

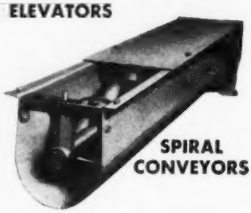


BUCKET ELEVATORS

Check these items . . . likely you need one or more right now. We build a complete line of equipment for handling, processing and reducing all kinds of material. We cannot show everything Jeffrey builds to speed production and cut costs, but send for Booklet No. 832 for a quick picture of our extensive line. Jeffrey's engineering facilities are available for laying out complete handling and processing systems or the application of individual units.



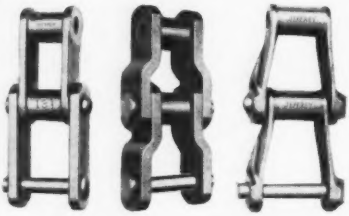
BELT CONVEYORS—IDLERS



SPIRAL CONVEYORS

SCRAPER CONVEYORS

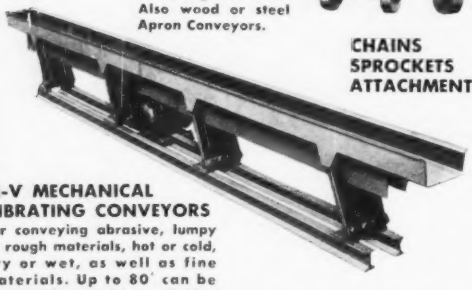
For handling bulk material horizontally or on incline, discharging at fixed point through valves in trough bottom. Also wood or steel Apron Conveyors.



CHAINS SPROCKETS ATTACHMENTS

FEEDERS—CONVEYORS

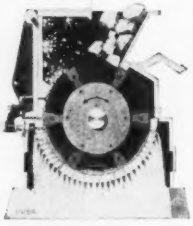
A wide range of sizes and types in electric vibrating feeders, conveyors, screens, packers, etc. Absolute control over tonnage handled.



M-V MECHANICAL VIBRATING CONVEYORS

For conveying abrasive, lumpy or rough materials, hot or cold, dry or wet, as well as fine materials. Up to 80' can be operated by one drive unit. Also electric vibrating conveyors, feeders, screens and packers.

More detailed information on request.



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BARREL PACKERS

For economy in packing operations—reduce size of container, increase its capacity and cut shipping costs. Also conveyor-type packers and packing tables.

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Complete Line of Material Handling, Processing and Mining Equipment

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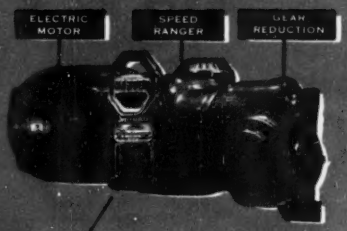
On thousands of applications in every field of manufacture, stepless variable speed operation assures exactly the right speed for every operation . . . for every operator . . . the right speeds for each change in the consistency or shape of the material being processed. Such variable speed operation pays off in higher rates of production, a more uniform better quality product and more efficient performance of your equipment and your operators.

Master Speedrangers provide this infinitely variable speed in an all-metal, mechanical variable speed unit whose compactness and durability are extra features which help you make a good job better. And nowhere else will you find variable speed drives that are so flexible, so easily adaptable and in such a wide range of types and sizes.



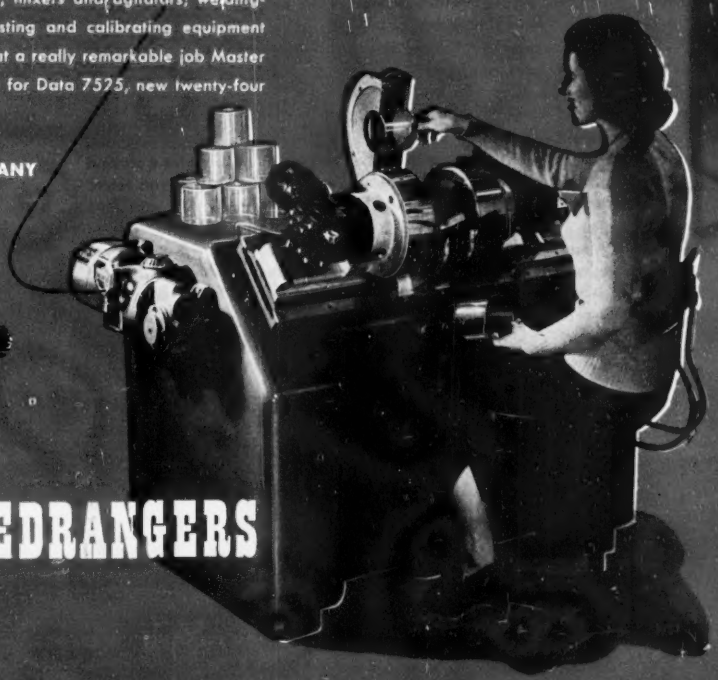
makes a good job better

again and again variable speed operation

For example, look at the plastic forming machine shown below. The Speedranger, on the drive unit incorporates an electric motor, a variable speed unit and a gear reduction . . . all standard Master units that easily combine into one compact, integral power package. This provides exactly the right speed, the right features, in a unit that you can mount right where you want it.

Probably you will not need this same combination of features. However, the next time you need a drive for material processing, handling, and conveying equipment; mixers and agitators; welding-positioners; machine tool drives; testing and calibrating equipment . . . to name only a few . . . see what a really remarkable job Master Speedrangers can do for you. Write for Data 7525, new twenty-four page booklet on Speedrangers.

THE MASTER ELECTRIC COMPANY
DAYTON 1, OHIO



especially when you use

MASTER SPEEDRANGERS

ANOTHER NOTABLE ACHIEVEMENT IN SERVICE LITERATURE BY JENKINS

THE NEW
BOOK No. 2
Nos. 26—50

practical piping layouts

The second series of twenty-five basic Piping Layouts (published by Jenkins Bros. in leading industrial, professional, and engineering publications) is now available in booklet form.

If you are among the hundreds of valve-users who received a copy of the first book, or if you saved any of the fifty Jenkins Piping Layouts as they appeared, then you know how helpful this information can be in planning any valve installations.

This new book brings you not only 25 practical piping layouts, arranged in convenient form for quick reference. It also includes a section on the fundamentals of valve design and application to help you select the type of valves best suited for the service.

Use it as a guide to proper valve selection and placement for longest service life and lowest operating costs. Use it also for an introduction to the wide range of Jenkins Valves for every industrial engineering and plumbing-heating service. You can obtain a copy by requesting it on your business letterhead. Address:

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Tells "Which valve where, and why"—with information in chart form for quick reference. A compact manual that will be prized by everyone, beginner and veteran alike, who plans piping.

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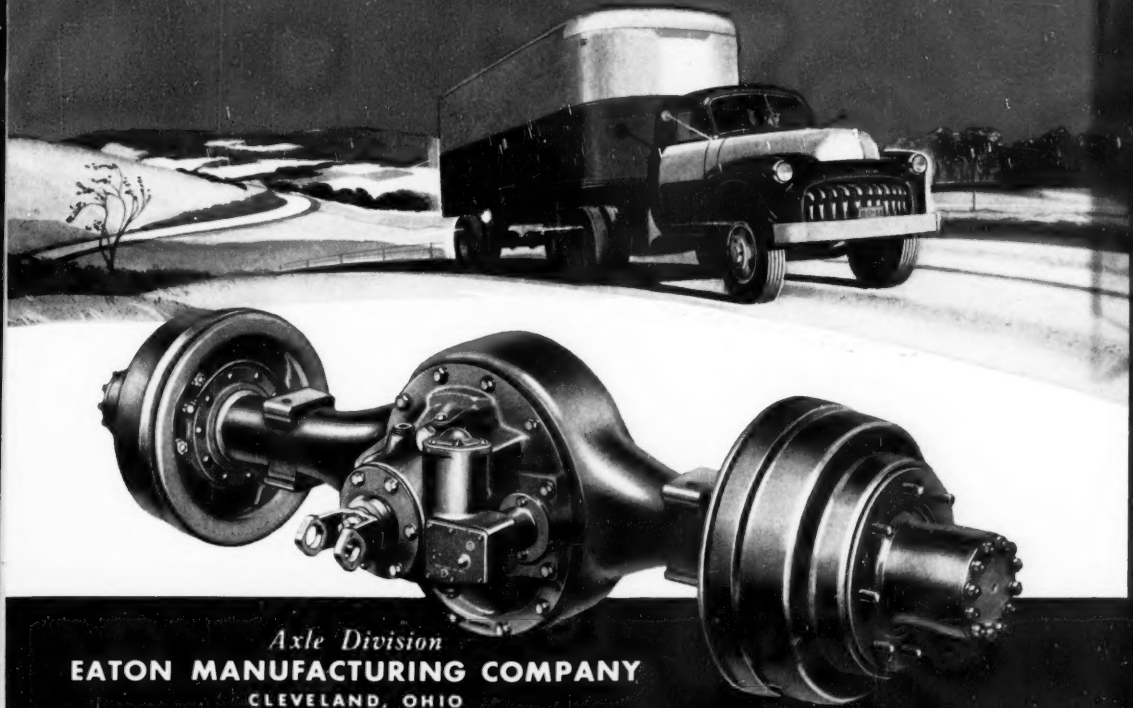
2-Speed Truck
AXLES

Lower "Per Mile" Costs

Maintenance expense, a major item in truck operating costs, is much lower when trucks are equipped with Eaton 2-Speed Axles.

Eaton Axles provide twice the conventional number of gear ratios . . . permit the driver to select the one best suited to specific operating conditions, with minimum strain on engine and power transmitting parts. Wear and breakages are reduced; repairs are needed less frequently, and trucks stay on the job.

Eaton Axles have many exclusive features to assure top axle performance for the life of the truck: planetary gears distribute loads over several gear teeth, dividing the stress; positive lubrication, even at slow speeds, reduces friction wear. For complete information, see your truck dealer.



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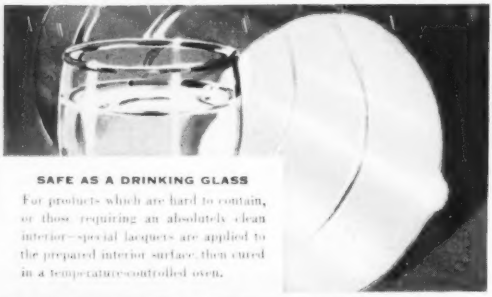
Consider the merchandising opportunities this remarkable new package presents! The durable and lustrous finish of Rheemcote drums, lithographed with *your* distinctive colors, trademarks and designs, will billboard your product and name before the eyes of the world.



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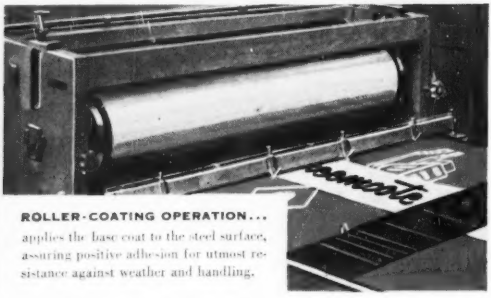
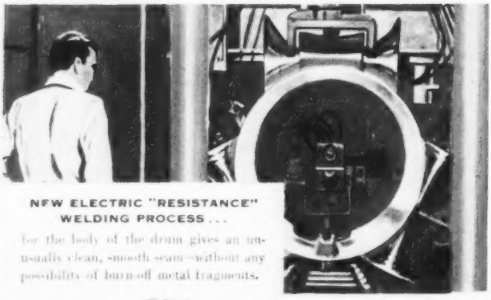
For products which are hard to contain, or those requiring an absolutely clean interior—special lacquers are applied to the prepared interior surface, then cured in a temperature-controlled oven.



ROLLER-COATING OPERATION...

applies the base coat to the steel surface, assuring positive adhesion for utmost resistance against weather and handling.



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for the body of the drum gives an unusually clean, smooth seam—without any possibility of burn-off metal fragments.

After many years of research, the Rheem Manufacturing Company, world's largest maker of steel shipping containers, is proud to have developed the Rheemcote Process in this, its 25th year of service to industry.

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ENGINEERING News

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SK ROTAMETERS APPLY CONTINUOUS PROCESS PRINCIPLES IN BATCH OPERATIONS

SK Rotameters have long been employed profitably in continuous process operations for indicating, recording, integrating and controlling fluid flow by using electrical and mechanical control instruments in conjunction with the Rotameter. This method of fluid measurement and control has proved highly efficient in continuous process due to the accuracy of the Rotameter, and its simple maintenance as compared with orifices and mercury filled differential head meters.

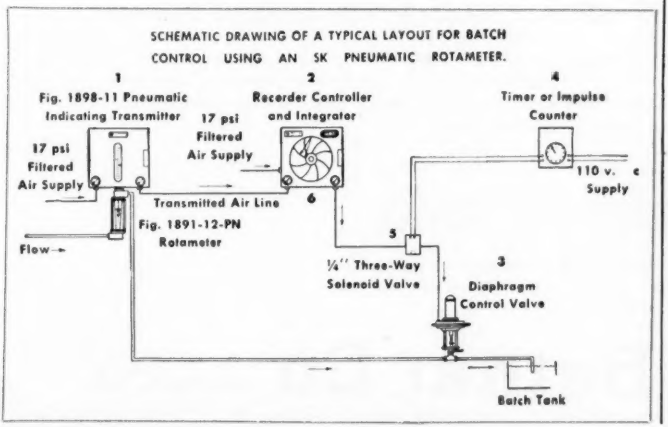
Now, with a minimum of additional equipment, SK engineers can apply the Rotameter control circuit to *batch process* installations for automatic, carefully-measured operation requiring minimum supervision and maintenance.

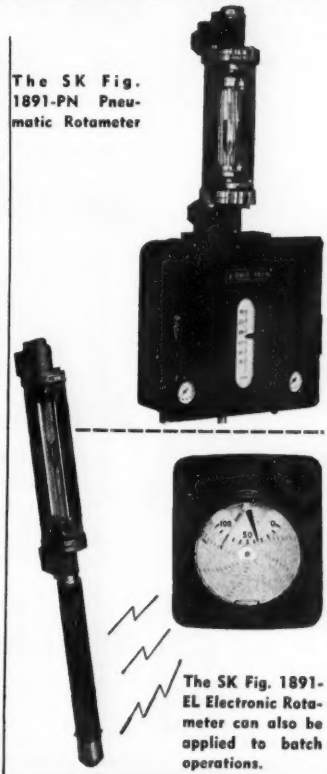
The flow diagram illustrated shows a typical layout for batch control with SK Rotameters. Many modifications of this instrumentation are possible so that it can be adapted for automatic control of practically any type of batch process. In this instance, the SK Rotameter with Pneumatic Transmitter (1) measures the rate of flow in the feed line to the batch tank and sets the pen of the Integrating Recorder Controller (2) accordingly. The Pneumatic Controller in this instrument keeps the rate of flow in the feed line constant by means of the Diaphragm Control Valve (3). The electrically operated integrator in the Recorder Controller (2) is connected electrically with the Electric Timer or Impulse Counter (4) whose scale, graduated in volume or weight units, can be set to a predetermined value required for the batch. When this amount of fluid has passed into the batch tank the Timer (4) closes the Solenoid Valve (5) in the air line connecting the out-put of the pneumatic control mechanism in the Recorder Controller (2) with the Control Valve (3) which in turn shuts off the flow to the batch tank.

In this manner, the amount of fluid required for the batch process is accurately and automatically kept at a predetermined value which can be varied according to requirements. At the same time the integrator in the Recorder Controller (2) indicates the total amount of material consumed for any number of individual batches.

This SK Rotameter control circuit is in successful operation in a large Eastern batch processing plant, daily lowering cost through automatic control and decreasing product rejection by accurate measurement.

If you have a batch control problem, write, giving us the facts. We may be able to help you.





The SK Fig. 1891-PN Pneumatic Rotameter

The SK Fig. 1891-EL Electronic Rotameter can also be applied to batch operations.

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Representatives in Principal Cities

Betner...*America's Busiest Bags*

Whatever the packaging need, there's a Betner bag to fill it!

Just a few examples of Betner's complete bagging service:

DUO-TITE . . . *the Perfect "No-Sift" Bag*

At last, the ideal bag for products which must be packaged in siftproof containers . . . insecticides, fertilizers and other dry chemicals. DUO-TITE's sturdy construction combines special liners with folding, gluing, and heat-sealing. Available in sizes holding up to 25 lbs. of bulk powdered material.

THERMOSEAL . . . *the Bag with 20% More Protection*

It's a fact. There is 20% more protection offered by Betner's THERMOSEAL than by other closures. Best of all, THERMOSEAL eliminates staples and other adhesives, and insures water-vapor protection, siftproofness and retention of flavor.

BENCOSEAL . . . *the Bag or Wrap with Extreme Water-Vapor Protection*

Absolute sanitation, dryness and flavor freshness are guaranteed by this unique combination of paper, metal foil and tissue laminated with a thermoplastic wax film. BENCOSEAL may be heat-sealed at moderately high temperatures without fear of blocking, thereby rendering itself to high speed production. It lends itself to any type of printing for consumer eye-appeal.

FLAV-O-TAINER . . . *the Bag with Vacuum-Packed Freshness*

Whenever freshness is a must—Betner's FLAV-O-TAINER delivers it! Lined with Pliofilm (mfd. by Goodyear T. & R. Co.), all inner seams are hermetically sealed. And simply by replacing air with inert gas, and heat sealing at top, FLAV-O-TAINER becomes an air tight unit.

A complete bag service . . .

from idea to finished bag. Also machinery for closing coffee bags, and inserting and closing liner bags in cartons. Your inquiries are welcome. Samples with full technical information will be promptly supplied.

Benj C Betner Co **DEVON, PA.**

BENJ. C. BETNER CO. of VA., Richmond, Va.; BENJ. C. BETNER CO., of WISCONSIN, Appleton, Wisconsin; BENJ. C. BETNER CO., Paris, Texas; BENJ. C. BETNER CO. of CALIFORNIA, Los Angeles, California; Southern Packaging Corporation, Affiliate of BENJ. C. BETNER CO.

WASHINGTON STEEL CORPORATION

MicroRold Stainless Steel

WASHINGTON, PENNSYLVANIA PHONE: WASHINGTON 5900

T. S. FITCH
PRESIDENT

May 1, 1951

OPEN LETTER TO THE DISTRIBUTORS OF MICROROLD STAINLESS STEEL SHEETS

The current demand for Type 430 sheet is certainly a tribute to you distributors, and we want to take this opportunity to thank you for a job well done.

Because there is not sufficient nickel we asked our distributors, in July 1950, to explore the practicability of substituting Type 430 straight chrome stainless steel. While it is recognized that Type 430 is not a "cure-all", there are many applications where it does adequately provide the required corrosion resistance and other desirable characteristics.

We also wish to reassure you that we shall endeavor to allocate our production in an equitable manner.

Cordially yours,

TSF:HH

WASHINGTON STEEL CORPORATION

T. S. Fitch
President

PS.--You are aware of the fact that the government regulations require us to supply 40% of our production for Defense Uses; this obviously means that we cannot provide as much tonnage for non-defense purposes as we used to provide, nor as much as we would like to provide, at this particular time.

T. S. F.

Chances are 500 to 1 there's a FRUEHAUF TRUCK BODY already designed to fit your special needs, too!

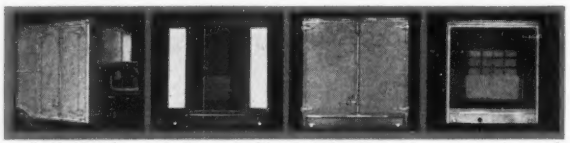
COUNT all the advantages of buying a Fruehauf before you consider any other Truck Body. 1) Custom-fitted to your job over 500 ways—in body options alone. 2) All-steel "Unit-Built" like Fruehauf's rugged Aerovan Trailers. 3) Wheelhousing and straight-frame models . . . in all popular lengths. 4) Fast assembly, mounting and painting service at 80 Branches coast-to-coast. 5) Custom-built quality . . . production-line prices.

See your local Truck Dealer or Fruehauf man, or write for our *new catalog* and *model make-up kit* — Fruehauf Trailer Co., Body Division, 10956 Harper Ave., Detroit 32, Mich.

FRUEHAUF
Truck Bodies

Only Fruehauf "Unit-Built" Bodies Offer All These Options . . .

1. Open Top
2. Solid Rear End
3. Solid Sides
4. Single Side Door

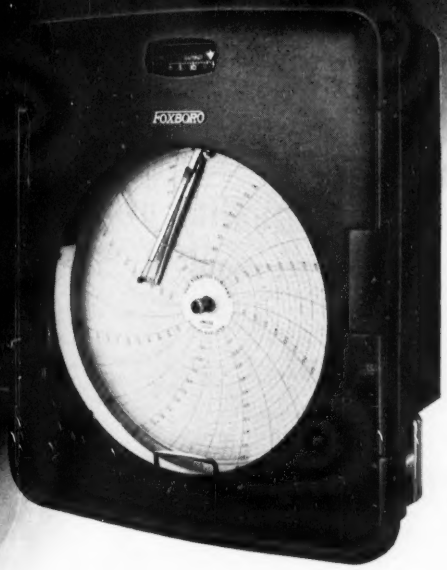


5. Double Side Door
6. Narrow Double Rear Doors
7. Full-Width Double Rear Doors
8. No Rear Door

9. Express Gate Rear
10. Tailgate (Outside Type)
11. Tailgate (Flush Type)
12. Tailgate (Doors Above)

better measurement and control of

FLOW



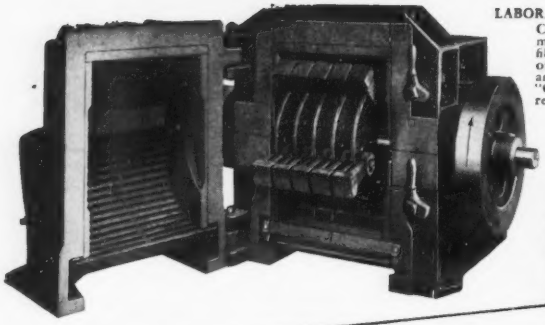
Wherever highest accuracy and complete reliability in flow measurement and control are vital to successful processing, it is significant that Foxboro Instrumentation is preferred. Whether your problem involves gas, steam, or liquids . . . in pipes, ducts, or open channels . . . the premium quality and complete diversity of Foxboro Instruments, backed by unequaled application experience, assure you an extra measure of satisfaction.

indicators • recorders • controllers • integrators
transmission systems • controlled valves • orifices
venturis • nozzles • pitot tubes

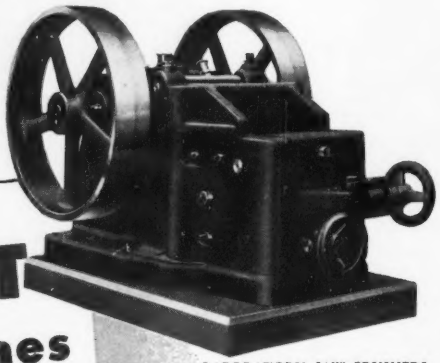
FOXBORO
Reg. U. S. Pat. Off.

For over 40 years, specialists in the measurement and control of temperature, pressure, flow, liquid level, humidity . . .

THE FOXBORO COMPANY • FOXBORO, MASSACHUSETTS, U.S.A.

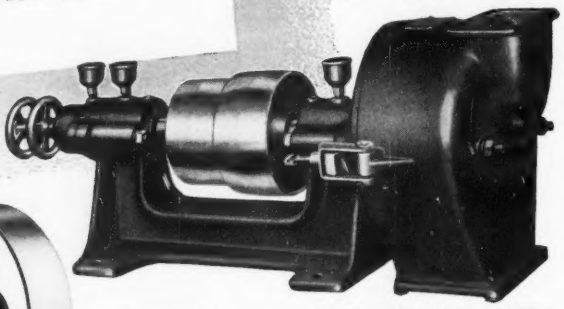


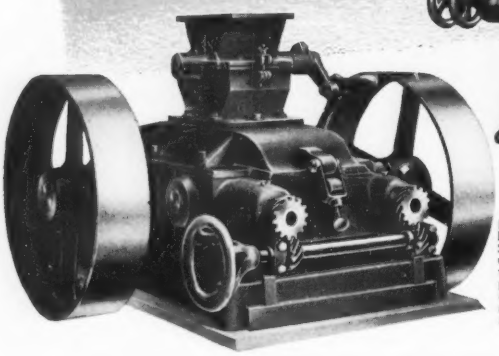
LABORATORY SWING-SLEDGE MILLS
Capable of reducing soft, moderately hard and tough or fibrous materials to any degree of fineness between 1 in. and 20 mesh. The patented "Open-Door" feature permits ready accessibility for cleaning.



STURTEVANT
Laboratory Machines
Assure Quality of Products
Fast - Economical - Accurate

LABORATORY JAW CRUSHERS
Special Roll Jaw action simplifies close regulation of the product with capacities varying from 300 or 400 lbs. per hour at finest settings, to 1000 or 2000 lbs. when opened for coarser work. Each part of the crusher is accessible for quick and easy cleaning.





LABORATORY CRUSHING ROLLS
First designed especially for laboratory sampling work, Sturtevant Crushing Rolls are used regularly in many plants where there are limited outputs. Range of output for the 8 x 5 size is from $\frac{1}{2}$ in. to 20 mesh — and for the 12 x 12 size from $\frac{3}{4}$ in. to 20 mesh.

LABORATORY SAMPLE GRINDER
Laboratory Sample Grinders are of the "Open-Door" disc type and are capable of very fine work, producing products as fine as 100 mesh (coarser if desired) when working on dry, friable, soft or moderately hard materials. Simply turn hand wheel to provide product regulation from 10 to 100 mesh.

The only sure way to maintain strict quality of products is laboratory control . . . and that calls for accurate sampling.

Sturtevant Laboratory Equipment meets the exacting requirements of laboratory work. They are fast and accurate . . . provide true samples.

Rugged and dependable, Sturtevant equipment actually has all the features of full size machines plus extra accuracy and wider range of adjustment. The "Open-Door" accessibility permits quick, thorough cleaning . . . prevents the possibility of previous batches from contaminating new samples.

Investigate Sturtevant equipment for your laboratory. It will cut your sampling costs . . . help maintain strict quality of products . . . increase sales. Write for complete details and catalog.

STURTEVANT MILL COMPANY
106 CLAYTON STREET, BOSTON 22, MASS.

Designers and Manufacturers of:
CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

DRY, STABILIZED, CRYSTALLINE VITAMIN A ACETATE

ANOTHER SIGNIFICANT PFIZER DEVELOPMENT

opens profitable new opportunities for fortifying food products

● For the first time in history Crystalline Vitamin A is now available in commercial quantities to manufacturers of food products in both DRY-STABILIZED and LIQUID forms that are particularly well adapted to a wide range of applications in the food and beverage fields.

DRY, STABILIZED, CRYSTALLINE VITAMIN A ACETATE

DRY.....free-flowing granules in three mesh sizes . . . can be handled and stored under all normal conditions. Packed in standard amber glass, screw top bottles and in drums.

STABLE.....insensitive to oxidation, permitting longer storage time, reduces overages.

PURE.....contains only Crystalline Vitamin A Acetate, sugar and gelatin, assuring higher quality products, greater consumer acceptance.

PALATABLE.....practically odorless and tasteless.

UNIFORM.....high uniform potency, standardized at 500,000 U.S.P. units per gram.

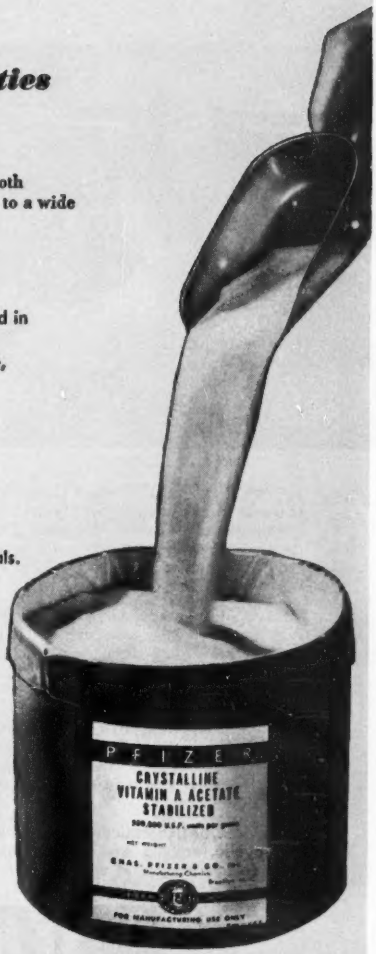
COMPATIBLE....coated crystals are isolated from other ingredients, permitting intimate mixtures with other vitamins and minerals.

VITAMIN A PALMITATE

A light yellow liquid of excellent uniformity derived from Crystalline Vitamin A Acetate. Not less than 90% pure. Free from oily diluents and impurities of undetermined nature. Practically odorless and tasteless. Potency not less than 1,650,000 U.S.P. units per gram.

Also available in Corn Oil Solution with a standard potency of 1,000,000 U.S.P. units per gram.

Packed in standard aluminum containers filled under nitrogen.



PFIZER QUALITY ® PFIZER

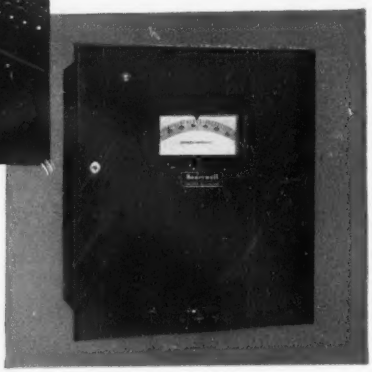
Pioneers and Leading Manufacturers of Vitamins

CHAS. PFIZER & CO., INC., 630 FLUSHING AVE., BROOKLYN 6, N. Y.; 425 NORTH MICHIGAN AVE., CHICAGO 11, ILL.; 605 THIRD ST., SAN FRANCISCO 7, CALIF.

A WHOLE NEW CONCEPT OF INSTRUMENTATION BASED ON BROWN CONTROL TECHNOLOGY IS REVOLUTIONIZING THE FOOD INDUSTRY FROM COAST TO COAST!

keeping an eye on grain temperatures

...with an *ElectroniK* PRECISION INDICATOR



IN THE New York Central Grain Terminal at Indiana Harbor, Ind., an operator checks the temperature of "acres" of stored grain without moving a step! He knows in an instant if there are "hot spots" . . . and where! He knows when it's time to turn over the grain.

This modern magic is made possible with an *ElectroniK* Precision Indicator with hundreds of thermocouples distributed throughout the bins. A simple push on a button instantly provides an accurate temperature reading. Button stays in until another is pushed . . . permitting logging of temperatures, if required. Temperature measurement is made through flexible cables that connect thermocouples to the indicator. Installation is easy . . . maintenance is minimized.

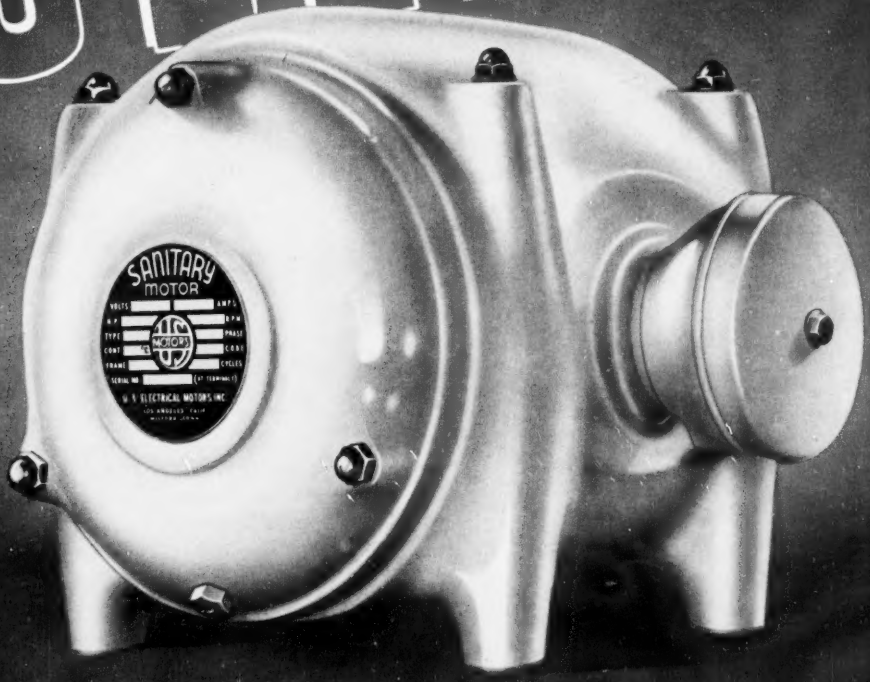
The *ElectroniK* Indicator is quick-balancing, non-cyclic, rugged and dependable. In addition to accuracy and convenience, its advantages in this application include the prevention of grain loss or degrading and the elimination of unnecessary agitation.

Ask for a demonstration of this amazing instrument. Call your local Honeywell engineer . . . he is as near as your phone! Write for Data Sheet No. 3.6-5. MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4502 Wayne Ave., Philadelphia 44, Pa. Offices in more than 80 principal cities of the United States, Canada and throughout the world.

MINNEAPOLIS Honeywell

BROWN INSTRUMENTS

CLEAN



U.S. Sanitary MOTOR

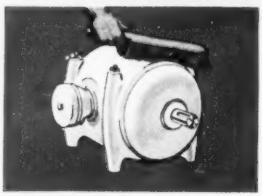
(See next page)

THE MOTOR THAT ACCENTS *eye appeal...*

TO INCREASE YOUR PRODUCT'S *sales appeal*

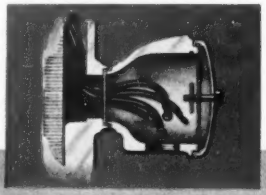
Customers buy through the eye. After you have striven to give your product the best in design and appearance, why tolerate an old-style, unkempt motor? By selecting the dynamically-contoured *U. S. Sanitary Motor* your product presents greater sales appeal. This magnificent motor is gracefully designed and is finished in glistening white baked enamel. It permanently maintains immaculate appearance and gives plant workers new incentive to keep equipment clean. It meets all sanitary codes. It costs only a few dollars more than run-of-the-mill motors. Equip your machines with this attractive motor. You'll have dependable power and most advanced design. The U. S. Sanitary motor embodies the features that built U. S. Motors' reputation for highest quality—asbestos-protected windings, solid, indestructible rotor, annealed steel laminations, and streamlined, shielded housings.

Ask for descriptive Bulletin 1554 featuring U. S. Sanitary Motor.

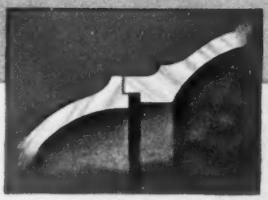


EASY TO CLEAN

WASHABLE



SEALED TERMINALS



FLUSH JOINTS

U.S. Sanitary MOTOR

U.S. ELECTRICAL MOTORS Inc.

PACIFIC PLANT: Los Angeles 54, Calif. ATLANTIC PLANT: Milford, Conn.

Atlanta 3, Ga.; Bakersfield, Calif.; Boston 16, Mass., Chicago 8, Ill.; Cincinnati 16, Ohio; Cleveland 14, Ohio; Dallas 9, Texas; Detroit 2, Mich.; Fresno 1, Calif.; Houston 4, Texas; Indianapolis 4, Ind.; Milwaukee 2, Wisc.; Minneapolis 2, Minn.; New York City 6, N. Y.; Philadelphia 2, Pa.; Pittsburgh 2, Pa., San Francisco 7, Calif.; Seattle 4, Wash. *Distributors and Agents in all principal cities.*

Makers of BOSCO use B·W VORTEX COOLERS

For Highly Efficient, Completely Automatic Processing

Bosco Company, New York City, utilizes Barry-Wehmiller Vortex Coolers in the production of *Bosco*, nationally known chocolate-malt flavored syrup. Many other producers of fine foods and beverages, packed in glass or metal, also assure highly efficient operation by using Vortex machines for cooling, pasteurizing, exhausting or freezing.

The basic engineering advantages of the Vortex pay dividends to users regardless of the application to their particular product. The patented "walking beam" conveyor and atomized spray method of heat transfer provide unusual operating economies. The unique hydraulic drive eliminates many gears and cam movements; holds friction to a minimum. Power requirements are unusually low.

Operation is entirely automatic and accurate speed control at the turn of a dial assures the finest speed adjustments to proper processing time. The Vortex is designed and engineered for years of heavy-duty, trouble-free service in many types of applications.

Write for complete information, sending us your requirements, today.

B-W BOTTLE CLEANERS PASTEURIZERS & PROCESSORS

BARRY-WEHMILLER Machinery Co.

257

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Wherever You are...

UNION CHAIN IS NEAR BY

Suppose you need UNION Machine Finished Steel Roller Chain...

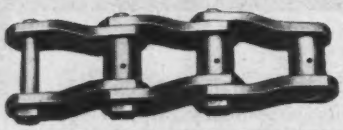
...and are certain of the pitch, length and sprockets required. Just write or phone your nearest Union Chain Stock Carrying Distributor listed on the facing page. He will make every effort to ship your requirements promptly.

...or suppose you need engineering assistance in the selection of a drive or a recommendation for a conveyor application. Talk or write to Union Chain's nearest district office as listed at the top of the facing page. You will receive unprejudiced, competent help.

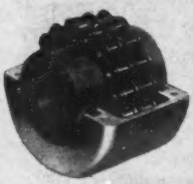
Unprejudiced because Union Chain makes all types of steel sprocket chains and is interested in providing each customer with the correct chain for satisfactory service at minimum cost.

Competent because Union Chain representatives are qualified through experience to make sound chain recommendations whether the application calls for roller chain, silent chain or one of the various heavy drive or conveying chains. We suggest it might profit you to discuss your chain problems with us.

UNION SILENT CHAIN



UNION HEAVY DRIVE AND CONVEYING CHAINS



UNION ROLLER CHAIN FLEXIBLE COUPLINGS

UNION SILENT CHAIN FLEXIBLE COUPLINGS

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Babcock Equipment Co.
163 Highland Ave.
Needham Heights 94, Mass.

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St. Paul, Minn.
Jurgens Company
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St. Paul 4, Minnesota

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Springfield, Missouri
To-Co, Inc.
801-805 N. Second St.
St. Louis, Missouri
Wildhagen Machine & Supply Co.
224 S. Third St.
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NEW JERSEY
Burton Supply Co.
390 Union Ave.
Paterson, New Jersey
Mill Supply & Hardware Co.
285-289 N. Willow St.
Trenton 4, New Jersey
Old Reliable Supply & Equipment Co.
11th St. & Newton Ave.
Camden, New Jersey

NEW MEXICO
Union Industrial Corporation
112 East Mermod St.
Carlsbad, New Mexico

NEW YORK
Laurence Belting Co.
111 Chambers St.
New York, New York
S. H. Pooley Belting Co.
38 W. Seneca Street
Buffalo 2, New York
Transmatic Equipment Co.
11 North Pearl St.
Albany, New York
U. & S. Inc.
Lincoln Bank Bldg.
509 S. W. Street
Syracuse, New York
Ulster Foundry Corp.
20 St. James St.
Kingston, New York

NORTH CAROLINA
Piedmont Mill Supply Co.
P. O. Box 130
Salisbury, N. Carolina

OHIO
Brubaker Gear & Mfg. Co.
Barberton, Ohio
Cincinnati Transmission Co.
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Cincinnati 7, Ohio
C. J. Edwards Company
5005 Euclid Avenue
Cleveland 3, Ohio
Lima Armature Works, Inc.
440 N. Main St.
Lima, Ohio
Mill & Factory Supply Co.
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Toledo, Ohio

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Wilkof Hardware & Supply Company
1100 Warner Road, S. E.
Canton, Ohio
Winkle Electric Co., Inc.
701 Andrews Avenue
Youngstown 2, Ohio

OKLAHOMA
C. F. Dagwell & Company
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Oklahoma City, Okla.
Ore Reclamation Company
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Eugene, Oregon
Fisher Bros. Company
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Knoxville, Tenn.
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Tipps Engineering & Supply Co., Inc.
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Dallas, Texas
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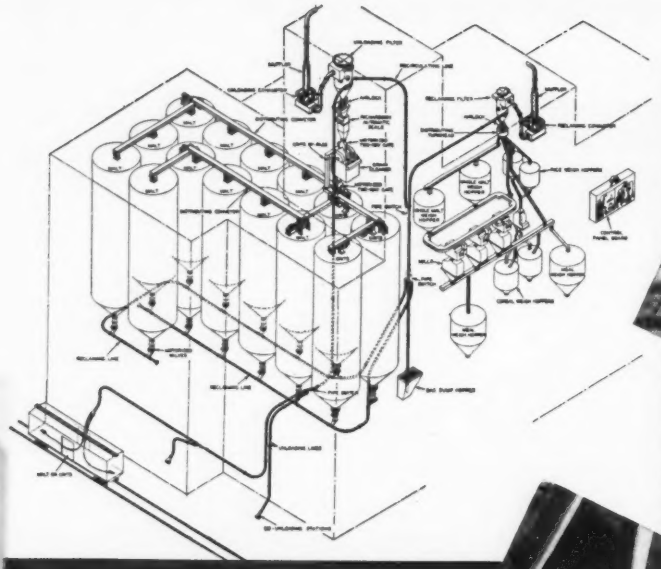

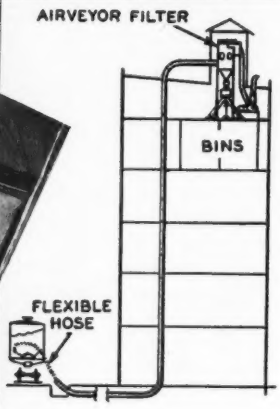

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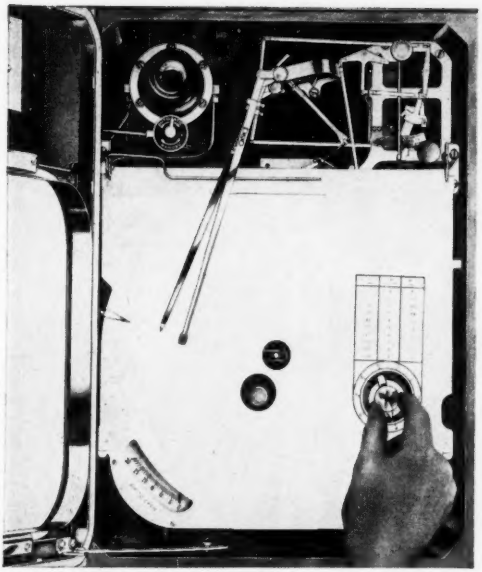
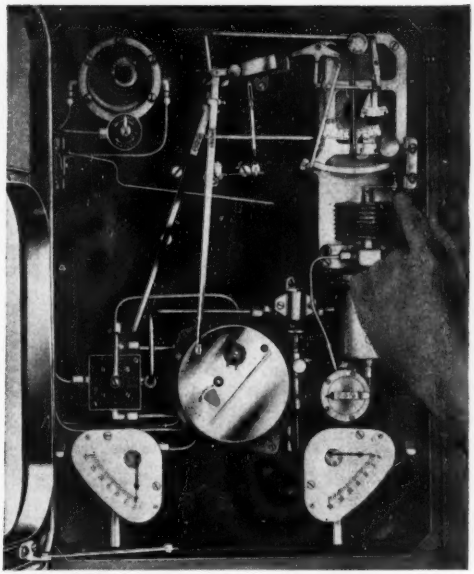


EASIEST TO PUT INTO OPERATION—Calibrated control actions save hours of shutdown. Reset, derivative and proportional values can be exactly reproduced at any time on the same or any other Series 500 controller . . . merely by duplicating the setting. Thus: controller adjustments can be standardized for any process throughout a plant or national organization.



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ONLY BRISTOL SERIES 500 CONTROLLERS GIVE YOU THIS EASE OF OPERATION

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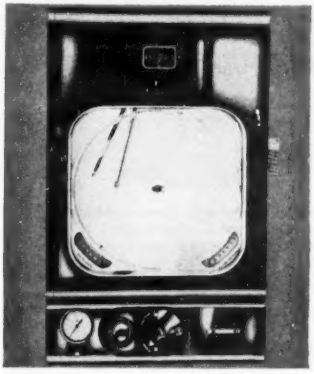
Furthermore, users report that the Bristol Series 500 Controller requires practically no maintenance.

This outstanding instrument—a product of 60 years of experience—is completely described in Bulletin A120. THE BRISTOL COMPANY, 115 Bristol Road, Waterbury 20, Conn.

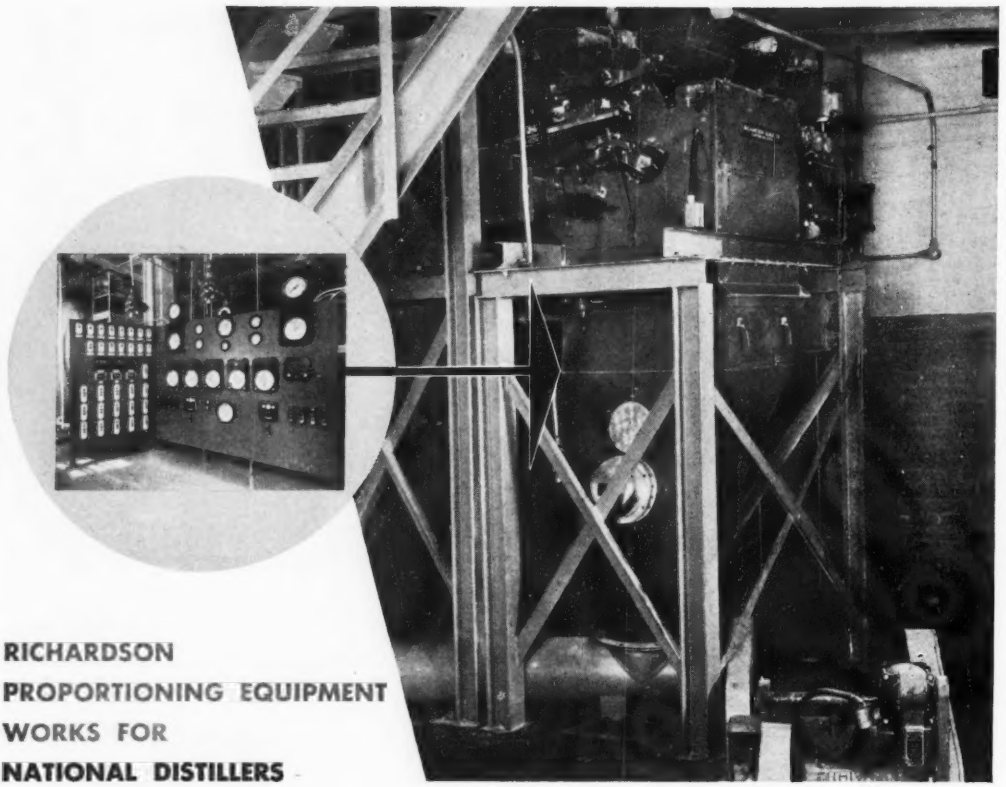


BRISTOL SERIES 500 CONTROLLERS are offered in five types—on-off, proportional, reset, derivative, reset plus derivative—to control temperature, flow, pressure, liquid level, humidity, pH. Conversion from one type to another can be made by the user. Model shown has external-manual station with mechanical interlock for test and service.

THE DEPENDABLE GUIDEPOST OF INDUSTRY

BRISTOL

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS



RICHARDSON PROPORTIONING EQUIPMENT WORKS FOR NATIONAL DISTILLERS

PROBLEM:

To proportion corn meal, rye meal and malt to the cookers of a large distillery in a CONTINUOUS STREAM, ACCURATE BY WEIGHT.

SOLUTION:

Installation of three Richardson Automatic Hopper Scales, with a control panel to co-ordinate scale action. Screw feeder and screw take-away conveyors provided a simultaneous, continuous, timed discharge of ingredients to the distillery cookers. The proportions of the ingredients, accurate to ¼ of 1%, can be conveniently altered for different formulae.

National Distillers Products Corporation, in their appeal to the public's palate, must rigidly follow individual and highly intricate formulae. Doing this involves a problem in precision proportioning. To solve it, National Distillers Products Corporation called upon the Richardson Scale Company to design and build the equipment to do this job. Richardson did just that. The result: rapid, accurate blending, and an end product that is consistent and distinctive.

Engineering and building systems for materials handling by weight has been a Richardson specialty for more than half a century. There is at your service a wealth of practical experience in every branch of the process industries. *Proven results* reinforce our claim that there is no pre-weighing, proportioning or mixing problem that cannot be solved efficiently and economically by Richardson engineers. If *your* product requires accurate proportioning, why not call in a Richardson Engineer and have him survey your present methods. There's no obligation on your part—and his suggestions can point the way to more profitable operations and readier sales.

Richardson Scale Co., Clifton, New Jersey. Feeder–Weigher Systems of All Types: Automatic Bulk Weighing Hopper Scales, Including Conveyor-Feed Types –Continuous Feeder-Weighers–Automatic Bagging Scales–Bag-Sewing Conveyors –Packers–Process Control Panels. *Branch offices in:* Atlanta • Boston • Detroit Minneapolis • Cincinnati • Wichita • Montreal • Omaha • New York • Pittsburgh San Francisco • Toronto • Buffalo • Chicago • Philadelphia • and Houston.

Richardson

MATERIALS HANDLING BY WEIGHT

6768

If your Product is hard-to-pack . . . *and you need to guard*

against Change in moisture content

Contamination

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Undesirable odors

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Loss of aroma

Loss from snagging and tearing . . .

Then you need Bemis Waterproof LAMINATED-TEXTILE Bags

The Strongest Shipping Bags Made

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If you don't require the exceptional protection of Bemis Waterproof Bags, Bemis Multiwall, Cotton or Burlap Bags are your best bet.

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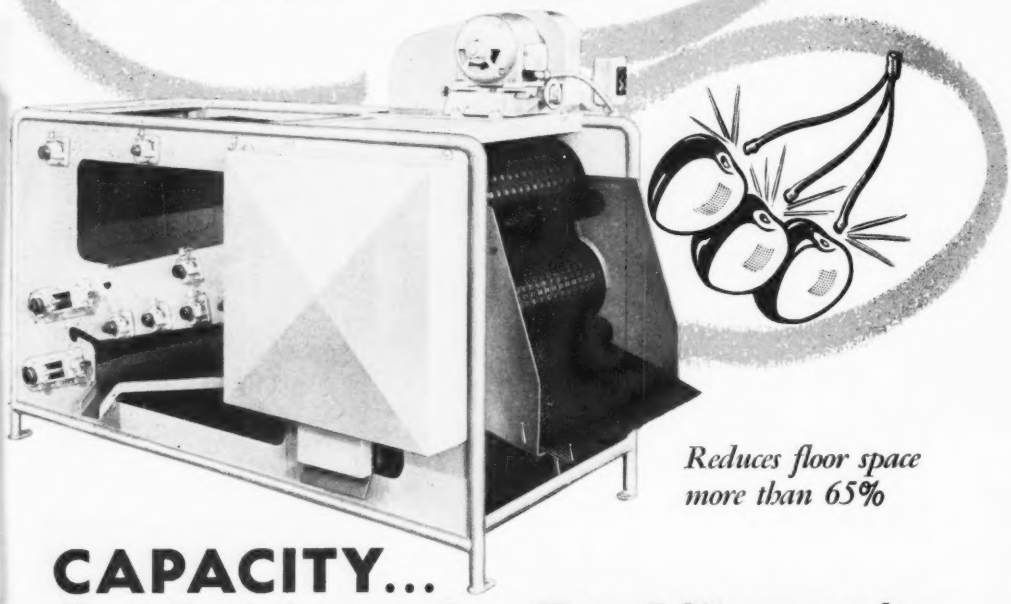
Efficiency...over 98%



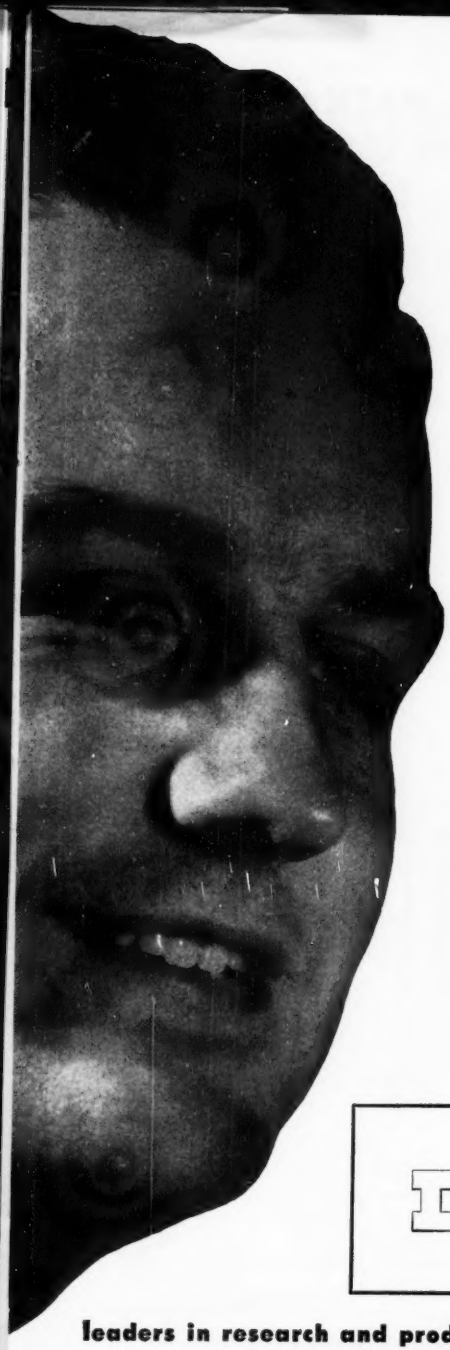
Reduces floor space more than 65%

CAPACITY...
(Fresh Fruit) 4 tons per hour *(Brined)* 2½ tons per hour

...Cherries are fed into the hopper and are carried by pockets formed by two rubber belts. As the perforated belts pass over the head pulleys the stems are automatically locked between the pulley and belt. The cherries are gently pulled from their stems by revolving soft rubber rollers. The stems revolve with the head pulleys and are brushed into a screw conveyor and discharged. The operation progresses so smoothly and gently that there is no damage to the fruit.

...The machine is unique in its simplicity of design, incorporating standard transmission parts which have given long hours of continuous and trouble-free service.

Manufacturing STANDARD and SPECIAL food processing equipment



fortify your foods with

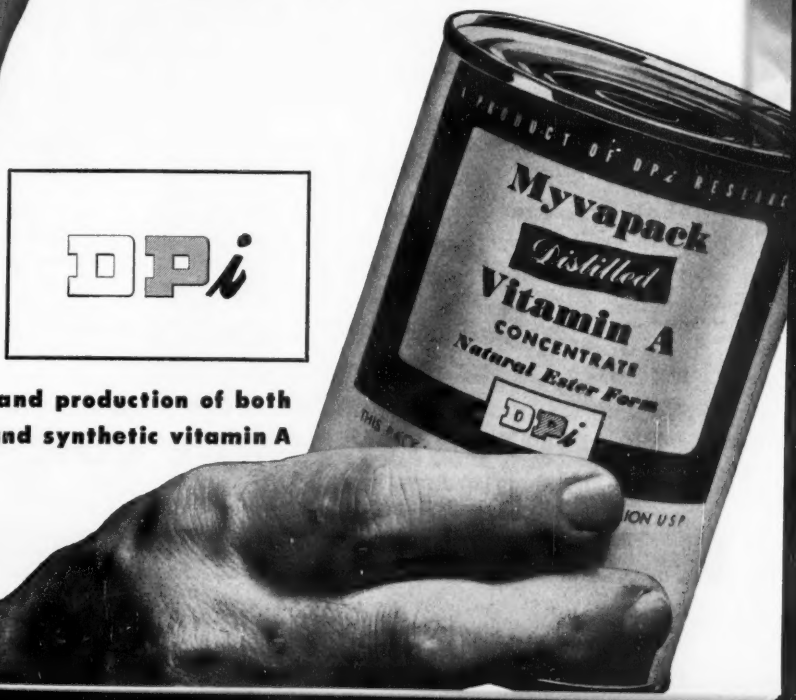
Vitamin A...

fortify yourself against competition!

IF you're searching for a new selling point to put your products out in front, vitamin A may well be your answer.

DPi Vitamin A is lower in price now than it has been in years, while stability and freedom from objectionable taste and odor are at an all-time high. That's the result of DPi's constant improvement of the unique molecular distillation process for natural vitamin A and DPi's pioneering research that made possible Myvax* Synthetic Vitamin A esters.

Which is best for your kind of product? We'll be glad to go into the details with you thoroughly and show you how Myvapack* Vitamin A Concentrate in pre-measured sealed cans simplifies mixing problems. Write ***Distillation Products Industries,*** 723 Ridge Road West, Rochester 3, N.Y. (Division of Eastman Kodak Company). Sales offices: 570 Lexington Avenue, New York 22, N.Y. • 919 North Michigan Ave., Chicago 11, Ill. • Gillies & Loughlin, Los Angeles and San Francisco • Charles Albert Smith, Ltd., Montreal and Toronto.



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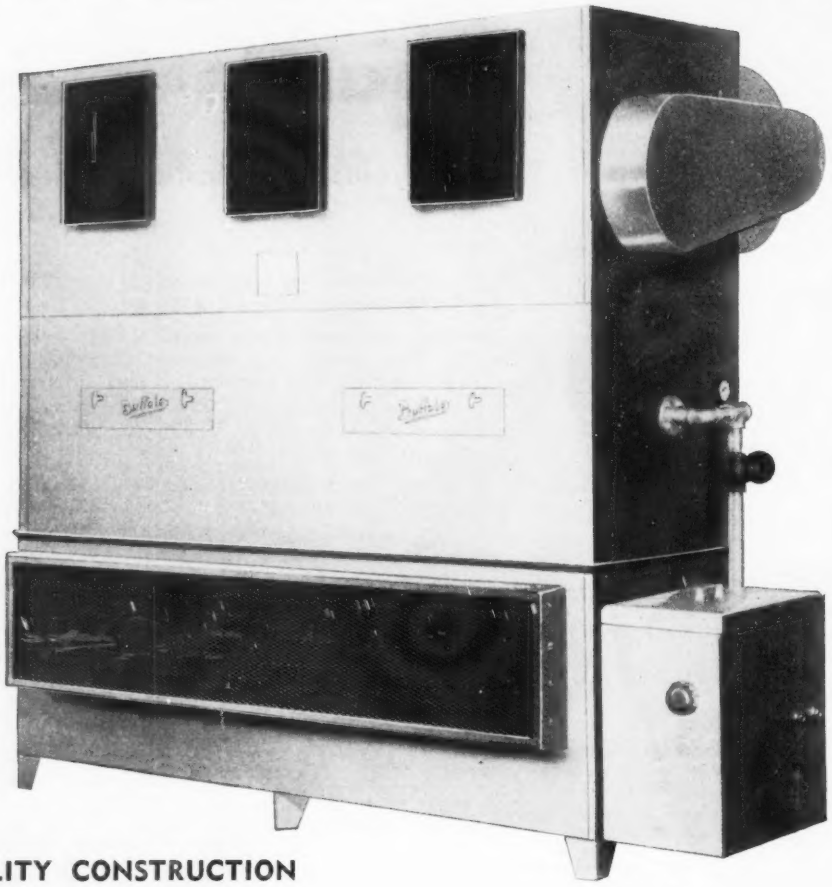
leaders in research and production of both natural and synthetic vitamin A

Also . . . high vacuum equipment . . . distilled monoglycerides . . . more than 3400 Eastman Organic Chemicals for science and industry.

*Trade-mark

"Buffalo" EVAPORATIVE COOLERS

—DURABLE "PACKAGE" UNITS FOR CLOSED-SYSTEM *LIQUID COOLING*



QUALITY CONSTRUCTION
That Prevents Trouble –

From installation on, "Buffalo" Evaporative Coolers save you money and trouble. In three basis sections (blower head, coils and tank), they can be moved in through ordinary doorways, and are simple to maintain. Fans are "Buffalo" hollow shaft "mixed flow" type—very quiet and efficient. Pumps for recirculating the spray water are by "Buffalo". Spiral fin coils are by Aerofin. In every respect, you will find these units to be space-savers, water-savers and trouble-savers while doing an effective cooling job.

WRITE FOR BULLETIN 3666

Check specifications and see how carefully built are "Buffalo" Evaporative Coolers, to give you better performance.

"Buffalo" FIRST FOR FANS

BUFFALO FORGE COMPANY

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Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Branch offices in all Principal Cities

VENTILATING FORCED DRAFT | AIR WASHING COOLING | AIR TEMPERING HEATING | INDUCED DRAFT EXHAUSTING PRESSURE BLOWING

Economical GAS Supplies delicious SPUDNUTS Fresh Each Day

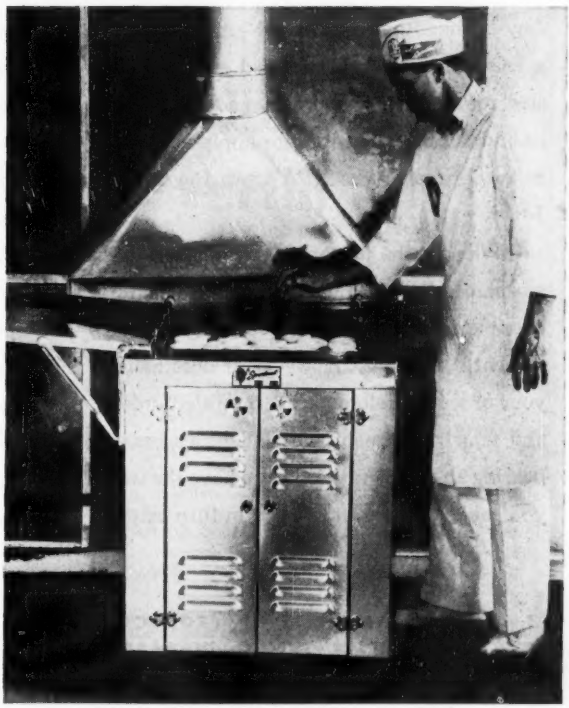
Home of Pelton's Spudnuts, Inc., Salt Lake City. Pilot plant and test shop is in right side of building.

"Less maintenance cost, lower operating costs," say Al and Bob Pelton about the advantages of modern Gas Equipment for baking. The Peltons, Co-Presidents of Pelton's Spudnuts, Inc., Salt Lake City, started with a new bakery idea 10 years ago, and turned it into a top-selling specialty.

Spudnuts have a potato base, and an exciting flavor all their own. Since 1940 the company has grown from 1 to nearly 300 shops in the U. S., with shops also operating in Alaska. The Peltons use Gas, not only to bake the light, fluffy Spudnuts perfectly, but to fire the Gas water heater, the Gas overhead heaters and the Gas furnace. Their model Test Shop with the Gas-fired Spudnut fryer is a research plant for study and improvement of Spudnuts.

GAS provides an economical, dependable way of baking for Al and Bob, and keeps maintenance costs low. Gas can do your baking better, too, because you get the exact temperatures you want, when you want them, with Gas. The cleanliness and thriftiness of Gas will appeal to you. Find out about Modern Gas Equipment from your Gas Company Representative —call him today!

Modern Gas fryer manufactured by Anetsberger Brothers, Inc., Northbrook, Ill.



Mr. Max Baker, Spudnut Corporation's Test Shop Manager, turns Spudnuts in their new Gas fryer.

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK

How to Get Steel for Maintenance and Repairs

use NPA Regulation No. 4

Any business—large or small—may now use a DO rating to obtain limited quantities of steel for maintenance, repairs and minor capital additions. The rating to apply is DO-97 as authorized by the NPA's new Regulation No. 4.

Obviously the use of this rating does not automatically get the steel because it is impossible to maintain complete stocks under present conditions. However, it does assure your order of preference over unrated orders and equal treatment with all other orders bearing a priority rating. If we have the steel you get it. Moreover, we can in turn extend the rating which should help us to maintain stocks for your future needs.

Because of broken stocks, we suggest you give us alternate sizes, gauges and qualities that would be acceptable. In this way you increase the chances of getting steel you will be able to use.

And remember, if your order falls within the provisions of Regulation No. 4 take advantage of it—use your rating! You can be sure that we will make every effort to take care of you as promptly and fully as possible.

If you do not have this Regulation No. 4 we will be glad to send you a copy.

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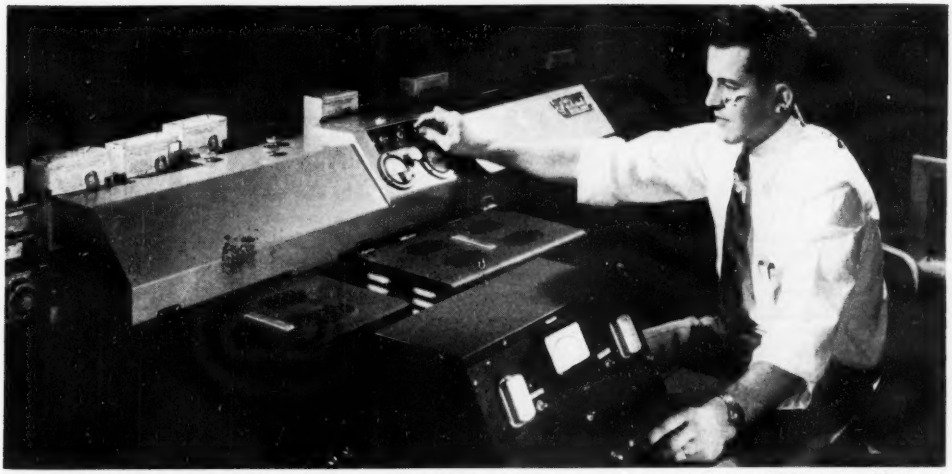
STEEL-SERVICE PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI • CLEVELAND PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO



PROFIT-EATING overweight food packages are minimized by automatic electronic statistical control system. Electronic check-weigher on high-speed line teams up with simple electronic computer and a servo-mechanism to adjust filler.

Automatic Statistical Control Saves on Package Overfill

New electronic system checkweighs 90 packages a minute on production line, analyzes weight variations, and operates servo-mechanism to adjust filler. Differentiates between normal and abnormal variations

ROGER L. MERRILL and WILLIAM HECOX
Battelle Memorial Institute, Columbus, Ohio

Several millions of dollars worth of material are being given away each year in overfilled packages. A reduction in the amount of product given away, without a corresponding increase in the number of short-weight packages, is a major objective of any package weight-control program.

The extreme high speeds of modern packaging lines have completely outstripped the methods of maintaining weight control. Manual spot-check weighing simply is not adequate for productive speeds of 50, 60 or 100 packages a minute.

Recently developed electronic computers and servo-controls using statistical methods provide—for the first time—a high-speed control system that is economical, completely automatic and scientifically sound. This automatic electronic statistical control system is commensurate with packaging-line speeds. And it has these distinct advantages:

- **It reduces labor costs by eliminating manual check-weighers and manual adjustments of the filling machine.**
- **Corrections to the filling machine are made only when justified by a shift in average package weight.**
- **The overall variation in package weights is reduced to the minimum possible for the particular packaging process.**
- **As a consequence of the reduction in variation, the average overfill can be reduced safely.**
- **It is not a spot-checking procedure. Every package is supervised. The equipment operates at high speed, never "gets tired," and never has to stop to "powder its nose."**

This system is essentially an electronic control chart for variables which operates automatically at speeds of up to 90 packages per minute. The first requirement of such a system is an electronic gaging or measuring device. The Selectrol electronic check-weigher meets this requirement.

This machine weighs each package as it moves along the conveyor belt, and it develops an electrical signal proportional to the deviation of each package from the nominal weight. These signals, representing weight deviations, are applied to an electronic computer, which determines the average weight and also determines the weight range.

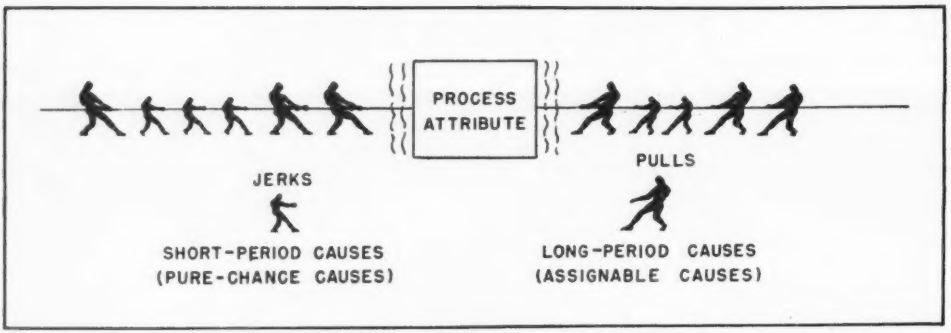


FIG. 1. IN FILLING PACKAGES, as in a tug of war, little short jerks, or variations, do not have as much effect as heavy steady pulls. Statistical control allows for the jerks and puts the finger on the pulls.

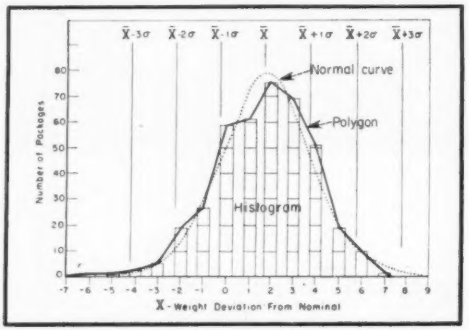


FIG. 2. CONFUSING DATA on package weight deviations (see table) take meaningful shape when converted to frequency distribution curves. Normal distribution curve is an exact mathematical curve.

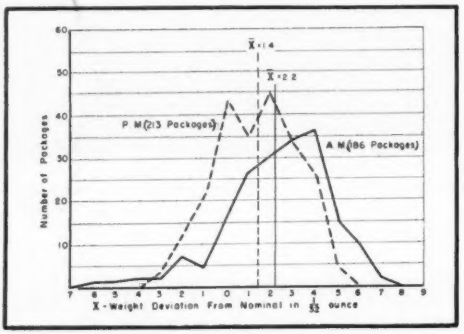


FIG. 3. WHEN MORNING and afternoon package runs grouped in Fig. 2 are plotted separately, the frequency distribution curves are different. If they were made to coincide by eliminating variation, overfill would be less.

Signals produced in the computer, representing the sample average weight and weight range, are compared with fixed signals representing the statistically determined control limits. The sample size can be preselected in a range from 5 to 50 packages. And usually every package will be included in a sample.

So long as the average weight of the sample and the range of individual weights are both within the set limits, the control system does not alter the setting of the filling machine. When the sample average is less than the lower control limit, a green pilot light is lit, a buzzer sounds and a correction signal is produced. If the average signal exceeds the upper control limit, a red pilot light is lit, a buzzer sounds and a correction signal is produced.

Similarly, the weight range is compared with control limits. When the sample range exceeds these limits, warning lights and buzzers are actuated.

The correction signals are applied to the meter on the front of the instrument. This meter is normally placed adjacent to the filling machine, and it is calibrated directly in grams or similar convenient weight units. These signals also can be applied through a suitable servo-controller to automatically adjust the filling machine, thus eliminating the need for a filling-machine operator.

Electronic computers recently have received considerable publicity. These multimillion-dollar electronic "brains" are designed to solve a wide variety of very complex problems. This particular electronic brain, however, is neither large nor complex, and it is comparatively inexpensive.

The Causes of Variation

Variation in product quality is inherent in all manufacturing processes. This is also true of the package-filling process. As a consequence, most packaging companies deliberately overfill packages to prevent any appreciable percentage of underfilled containers from reaching the market.

There are numerous possible causes for variation in package weights. Changes in product density and in the adjustment of the filling machine, uncertainty in the cutoff point of the filling machine, variations in the amount of product in the filling-machine hopper, and changes in the flow characteristics of the product—these are only a few of the typical causes. Some of these causes fluctuate rapidly and produce variations in the weights of *consecutive* packages. Others change slowly and cause gradual trends in the *average* package weight.

Any filling system will have a particular pattern of weight variation that is inherent in that system. This pattern of variation is a result of the random action of those causes that fluctuate through an appreciable portion of their total range of variation between consecutive packages. Such a variation is said to be the result of a system of pure-chance causes.

The causes for these variations cannot be identified by weight measurements alone. Consequently, they cannot be controlled. Redesign of the filling operation may reduce these chance causes of variation. However, because of the nature of some products and the high speed of modern filling lines, the reduction in chance causes may be so small that the redesign would not be justified.

TABLE—WEIGHT DEVIATIONS of Every 15th Package in Run of 399 Packages

Package Number	Deviation, in 1/32-oz. Units
6	−2.0
21	1.5
36	−5.5
51	2.0
66	0.5
81	6.0
96	3.5
111	1.0
126	3.0
141	4.5
156	4.5
171	3.5
186	4.0
201	−0.5
216	1.0
231	3.0
246	1.0
261	2.0
276	1.5
291	2.0
306	0.5
321	2.5
336	1.5
351	−0.5
366	0.5
381	−1.5
396	2.5

For most filling systems, the average level of this normal pattern of variation will change as a result of the action of assignable causes that vary slowly. A cycle of variation of an assignable cause extends over a number of packages. In many cases, it is possible to adjust the filling machine to compensate for these assignable variations, provided they are detected sufficiently early in the cycle. The overall pattern of variation for the filling system is a result of the combined actions of the normal pure-chance causes and the assignable causes.

The effects of the action of pure-chance causes and assignable causes on weight variation are somewhat analogous to the tug-of-war pictured in Fig. 1. The Jerks (short-period causes) produce a variation in package weight about some average value. The Pulls (long-period causes) produce variations in this average.

The ability to distinguish between assignable variations and normal pure-chance variations is the principal requirement for an effective package-weight-control system. The earliest possible indication of assignable variation is necessary to accomplish the greatest reduction in overall weight variation.

Measurements for Weight Control

Manual check-weighing is used as a basis for the control of package weights on most food-packaging lines. One or more operators select packages from the line, weigh them, and then make a decision as to whether the filling machine should be adjusted. This is an exceptionally primitive operation in comparison with recent advances in the design of filling machines and other packaging machinery.

At a typical line speed of 60 packages per minute, for example, a single operator can check perhaps 1 package out of every 15. The accompanying table presents the weight deviations of every 15th package taken from an actual production run of 399 packages. The first package was chosen at random from the first group of 15 packages, with other choices following the first at 15-package intervals. The weight deviations were measured in units of 1/32 oz. from a zero level equal to the label weight. For all 399 packages, the average overfill was 1.75 units.

On the basis of individual weight deviations, such as given in the table, the operator must decide whether the process is operating at the desired average overfill, or whether a correction should be made to the filling machine. If 1.75 units is the desired average overfill, are all of these weight deviations due to normal variations in the process? Does the deviation of package No. 36 indicate that the process average is low? Does the deviation of package No. 81 indicate that the process average is high? What percentage of the packages will be underfilled?

Clearly, it is impossible to answer these questions on the basis of any individual weight measurement. In actual practice, an operator acquires a "feel" for the particular packaging process and has some idea of the normal variation to be expected. By mentally averaging several weight deviations and by using some "sixth sense," the operator makes a decision as to whether the filling machine should be adjusted.

The major objection to this system of control is that the operator must make a control decision on the basis of a very limited amount of information. Nor would checking every package be of much assistance, even if it were economically feasible. The operator has no precise criteria to use in deciding whether an individual weight measurement indicates a significant change in the average weight level. Manual methods of control, based on individual measurements, depend for success upon experienced operators and the exercise of good human judgment. In addition, labor costs make such systems comparatively expensive to operate.

HOW STATISTICAL CONTROL WORKS

The methods of statistical quality control have been applied to a wide variety of control problems during the past ten years. The outstanding success of these methods in other similar applications indicates their potential value to the control of package weights.

Statistical methods of control overcome most of the objections to control based on individual measurements. The chief advantages of these methods are:

1. They provide definite technics for condensing a large amount of information so that patterns of variation can be readily visualized.

2. They provide the necessary criteria for distinguishing between assignable and pure-chance variations.

Several statistical methods are available for condensing a large quantity of weight data so that they can be used more effectively. The grouped frequency-distribution diagram is one of the most useful of these.

Fig. 2 shows frequency-distribution diagrams of the weight deviations of all 399 packages from which the data in the table were taken. The total range or spread of the weight deviations is divided into 14 weight cells equally spaced along the horizontal axis. The height of the bar erected on each weight cell is proportional to the number of packages falling in that cell. The figure formed by these bars is called a *frequency-distribution histogram*. Straight lines drawn between the tops of each bar form a figure called a *frequency-distribution polygon*. Either the frequency histogram or polygon is a good pictorial representation of the variation in package weights.

This frequency-distribution polygon can be approximated by an exact mathematical curve called a normal-distribution curve. A normal curve is shown dotted in the figure to illustrate how closely it fits the observed frequency distribution.

The advantage of using the normal-distribution curve is that, for most purposes, it can be completely specified by two quantities. One of these is the average value, designated by the symbol $\overline{X}$, which specifies the location of the center of the distribution. The other quantity is called the standard deviation, designated by the symbol σ, which defines the spread of the distribution. The value of the standard deviation σ is very significant in statistical weight control. For those weight distributions which approximate the normal curve, roughly 67 percent of all packages will fall within the $\overline{X} \pm 1\sigma$ limits shown by two vertical lines on

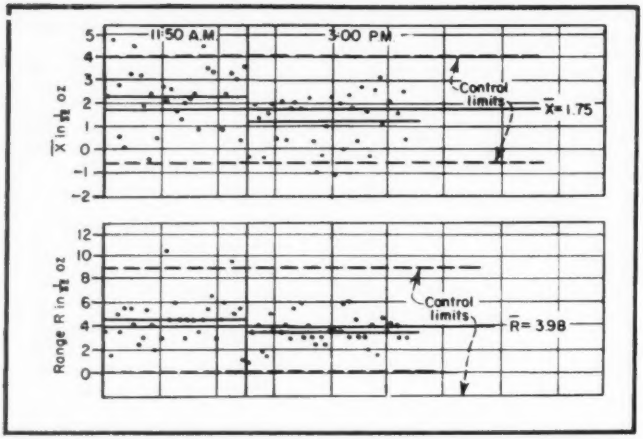


FIG. 4. THESE CONTROL charts provide a sensitive and convenient method for detecting assignable variations. Upper chart shows weight deviations for samples of 5 packages. Control limits are based upon normal pure-chance variation. Points outside limits suggest assignable variations. Each point on lower chart represents a difference in weight between heaviest and lightest packages in each sample of five. Any point outside control limits indicates change in inherent variability of process.

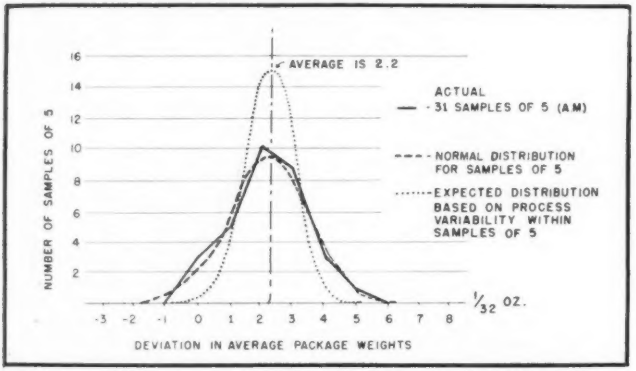

AVERAGE IS 2.2
ACTUAL
31 SAMPLES OF 5 (A.M.)
NORMAL DISTRIBUTION FOR SAMPLES OF 5
EXPECTED DISTRIBUTION BASED ON PROCESS VARIABILITY WITHIN SAMPLES OF 5
NUMBER OF SAMPLES OF 5
1/32 OZ.
DEVIATION IN AVERAGE PACKAGE WEIGHTS

FIG. 5. Frequency distribution curves for averages. Pattern of sample averages will always approximate a mathematically normal distribution for statistically stable processes. Consequently, the number of averages which fall within given limits can be predicted accurately. Dotted curve represents minimum variation that can be expected with this process.

the figure. Ninety-five percent of the packages will fall within the $X \pm 2\sigma$ limits. More than 99 percent (or, for all practical purposes, all of the packages) will fall within the $X \pm 3\sigma$ limits. Much of the theory of statistical quality control is based on the properties of the normal frequency distribution.

Morning-Afternoon Variation

It is of interest to look a little more closely at the variation in the weights of the 399 packages. The packages were actually taken from the line in two groups. One hundred eighty-six consecutive packages were taken from the line during a morning run, and 213 consecutive packages were taken from the line during the afternoon. Frequency-distribution polygons for these two runs are shown in Fig. 3. The solid line is the frequency polygon for the morning group, and the dashed line is the frequency polygon for the afternoon group.

Note the difference in the averages for the two groups. The average for the morning group is 2.2g. overweight. For the afternoon group, it is 1.4g. overweight. (The overall frequency distribution shown in Fig. 2 is simply the sum of these two distributions.) It is obvious that, if the averages for the two groups could be made to coincide, the spread or standard deviation for the overall distribution would be smaller. This reduction in the overall variability of the package weights would permit a reduction in the average overfill for this packaging line.

This shift in average weight is an indication that assignable causes for variation were acting on the system. Such a conclusion is not immediately apparent from an examination of the individual measurements in our table.

Convenient Control Charts

The technics of statistical quality control provide a more sensitive and convenient method for detecting assignable variations than the frequency-distribution diagrams. This method is the use of control charts for variables.

Control charts for the 399 packages are shown in Fig. 4. Each point on the upper chart represents the average weight deviation of a sample of five consecutive packages taken from the line. This chart is called the $\bar{X}$ chart or the chart for averages. The heavy line is the grand average for all 399 packages. Lines for the averages of the morning and the afternoon runs are also shown.

The dashed lines above and below the average are the upper and lower control limits. The position of these lines is determined by an analysis of the normal pure-chance variation in the filling process. Approximately 99.7 percent of all of the sample averages should fall within these limits if no assignable variations are present. Thus, if a point falls outside a control limit, there are strong reasons to suspect that the process average has shifted. In this case, three points of the morning run are above the upper control limit and the process average is known to be high. For the afternoon run, two points are below the lower control limit and the process average is known to be below the overall grand average.

Each point on the lower chart of Fig. 4 represents the difference in weight between the heaviest and the lightest packages in each sample of five. This is called the R chart or range chart. The dashed lines are again statistically determined control limits. Any point outside these limits indicates that the inherent variability of the process has changed. The range of a sample is an indication of the spread in the frequency distribution and is related to the standard deviation mentioned previously.

These statistics, the average $\bar{X}$ and the range R, will also have a particular pattern of variation. The frequency distribution for the averages of 31 samples of five packages each taken from the morning run is shown in Fig. 5. It is a characteristic of sample averages that their pattern of variation will always approximate a mathemat-

ically normal distribution for statistically stable processes. Consequently, the number of averages that fall within given limits can be predicted with considerable accuracy. The spread of the distribution of averages is also much smaller than the spread of the distribution for individuals. The spread of the distribution for averages is approximately $1/\sqrt{n}$ of the spread for individuals, where n is the sample size.

Averages tend to mask the variations caused by short-period random causes. The control-chart control limits are based on the variation of the statistic ($\overline{X}$ or R) that might be expected due to random short-period variations alone. The standard deviation of the distribution of averages, if no assignable variations are present, can be determined by statistical methods. The dotted curve in Fig. 5 represents the distribution that might be expected, based on the variability within samples of five packages. It represents the minimum variation that can be expected with this process. It is obvious that, if the over-all variation could be reduced to this minimum, the average overfill of the process could be safely reduced.

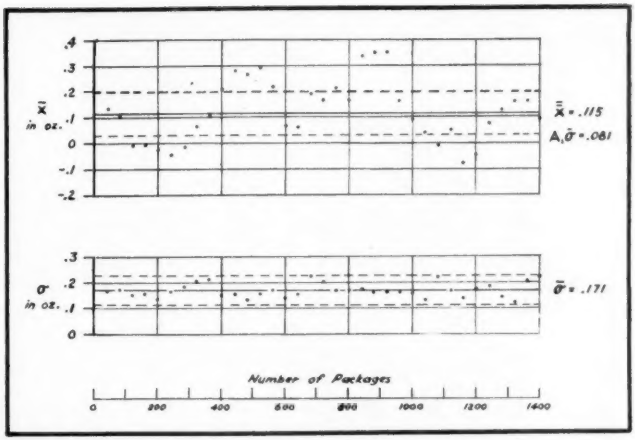


FIG. 6. Control charts for another packaging line, based on samples of 40 packages each. Chart for averages (top) clearly shows undesirable long-period assignable variations.

Larger sample sizes will tend to mask longer-period variations. The variation in the averages of large samples will reveal more clearly the long-period assignable variations. Fig. 6 shows the control charts for another packaging line. These charts are based on samples of 40 packages each, and the chart for averages clearly shows long-period assignable variations. The control chart for σ shows that the variability within samples is stable.

Frozen Food Growth Is Striking

Here Are Revealing "Finger Tip" Facts

Forty years ago, frozen foods were only a dream. Today there are over 1,043 active frozen food packers with 1,200 different brands. And there are more than 200 kinds of frozen foods on the market.

Some $40,000,000 *has been spent for research—one-third of this devoted to the development of new products. The most outstanding development is concentrated frozen citrus juices.*

The present worth of the Florida Concentrated Citrus Industry is set at $750,000,000 in invested capital. In its first year ('45–'46), it produced 200,000 gal. of concentrated frozen orange juice. Last year, output rose to 23,000,000 gal.

This provides only one 6-oz. can of concentrate, each 6 months, per capita in the U. S. When reconstituted, however, this 1950 production makes 80,000,000 gal. of single-strength orange juice.

Accounting for 40 percent of all frozen food sales, the product is sold in 96 percent of the retail outlets. This portion of the retail outlets accounts for 83 percent of all food store sales.

General frozen food retail sales are rising, too. In 1947 *the average sales volume of frozen foods in a retail outlet averaged* $1,000 *per store. It increased to* $2,100 *in* 1948; $2,500 *in* 1949; *and will probably exceed* $3,000 *in* 1950.

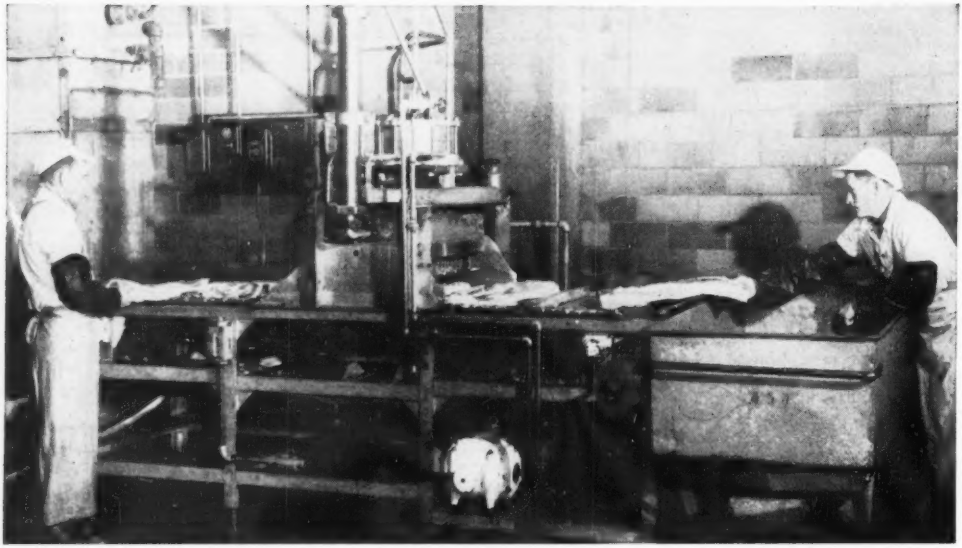
Increase in number of regular users of frozen foods is evidenced in the report that of the 34 million electrically wired homes in the U. S., 1 out of 14 now has some form of freezer storage. This approximates 10 cu. ft. per home and totals about 240,000,000 cu. ft.—equal to that of the public warehouse freezer space. (Does not, however, include space in cabinets in clubs, hospitals, hotels, restaurants, etc.)

As for expansion of refrigerated storage space, there are now 400,000,000 *cu. ft. of space in public warehouses, of which* 60-75 *percent is freezer storage, and there are* 10,500 *locker plants operating now, which on an average, have* 500 *lockers each. These individual lockers average* 6 *cu. ft. in size, making a total of* 31.5 *million cu. ft. of frozen food locker space.*

The armed forces, which purchased 66,000,000 lb. of frozen foods at the peak of the war in 1944, now becomes a bigger customer. Per capita consumption of frozen foods in the armed forces in 1944 was 5.3 lb.; in 1950 it increased to 32.0 lb.

Total purchases by Market Center Procurement for 1950: 29,500,000 *lb. of frozen vegetables,* 8,500,000 *lb. of frozen fruits, and* 5,500,000 *lb. of frozen concentrated orange juice. And Market Center Procurement projects for* '51: 56,000,000 *lb. of frozen vegetables,* 10,500,000 *lb. of frozen fruits, and* 11,000,000 *lb. of frozen concentrated orange juice.*

The QMC issue factor for frozen vegetables is 10 lb. per 100 men per meal, and concentrated frozen orange juice is issued 6-8 times monthly in Winter and 10-12 times monthly in Summer.



THIS is the Kingan Inject-O-Cure machine which has revolutionized bacon curing. It forces pickle into meat, to give 24-to-48-hr. cure. Injector needles may be seen at right center.

Quick Bacon Cure Saves 17 Days,

Automatic machine injects pickle through 101 needles. Two men handle 200,000 lb.

L. E. MALCOM

Special Assistant to Vice-President in Charge of Production, Kingan & Co., Indianapolis, Ind

Food Engineering has revolutionized the curing of bacon bellies, jowls, squares and butts. Bellies are quick-cured in 24 to 48 hr., instead of the customary 18 days. This speed-up brings the packer many important benefits. Among them are higher quality, greater productivity, smaller space requirements and less investment in inventory.

Quick curing in continuous production-line fashion is made possible by the Inject-O-Cure process developed by Kingan & Co., well-known Indianapolis, Ind., meat packer.

How It Operates

Here, briefly, is how it works: Bacon bellies are conveyed underneath an injector mechanism to which are attached 101 hollow needles. The conveyor stops momentarily and a pneumatic lift pushes a belly upward to force the needles in the meat. Then compressed-air actuates plungers to force curing solution through the needles and into the belly. The action is analogous to giving the meat 101 hypodermic shots at the same time.

After the pickle is injected, a metal plate pushes the belly off the needles. This belly then is conveyed from the machine and another automatically moved into injection position.

As you can see, the process is unique and ingenious. And you will understand why it revolutionizes bacon curing when you read the detailed account of its benefits.

Important Economic Values

The Inject-O-Cure method offers the meat packer further opportunity to reduce the time his capital is tied up. It permits production of the cured product to be adjusted more readily to sudden changes in demand. And it allows the packer to offer a product which meets the needs and taste of the buyer.

With this method, the necessity of estimating the demand for cured bellies weeks in advance is eliminated. The meat can be cured quickly, enabling the packer to step up or reduce his production as sales of bacon increase or decrease. And the packer is not at the mercy of a bad market for sliced bacon when fresh bellies can be sold readily.

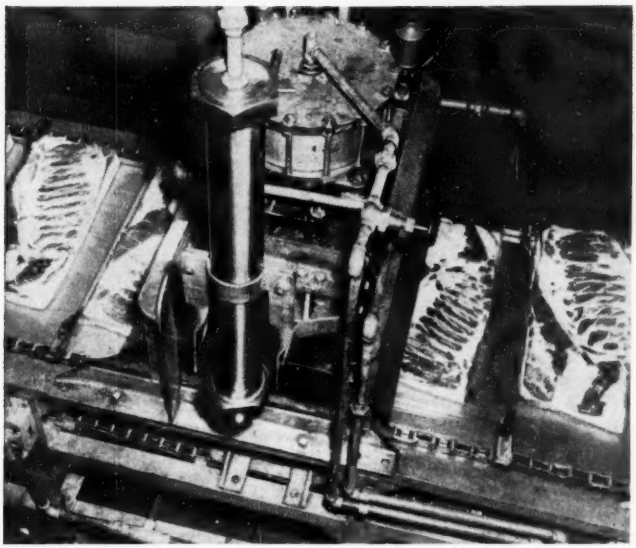
Operating Advantages

The process enables the packer to utilize labor to better advantage, and it does not require the sizable space that has been needed for other curing methods.

A production of 200,000 lb. in a 40-hr. week is the capacity of the present machine. This, of course, varies with the weight of the bellies, since the machine pumps 10 bellies per minute.

Only two operators are required—one to load and one to unload the feed conveyor. The graded product is trucked to the machine, and the same trucks are used to haul the injected product to storage for 24 to 48 hr.

It is unnecessary to rehandle the product in storage, no overhaul being required. Where cured bellies are to be shipped, direct loading into the car is possible, with significant saving of space and labor.



CLOSE-UP of new unit. Pneumatic cylinder (top) operates injection plungers. Indexing pusher-bar conveyor moves bellies into and out of machine.

Reduces Investment

in 40-hr. week. Result: Significant cost processing advantages

Capital made available for other uses by reduction in inventory is further augmented by the reduction in capital needed to provide space and equipment.

Proves Big Success

Here is proof that the ingenious process is paying off in practice. Trade acceptance of bacon cured by this method has convinced Kingan that it meets discriminating tastes. And experts cannot tell the difference between the quick and the conventional cured bacon.

No less than 19 meat packers had accepted the process a few months after it was made available on a license basis. And it was not offered by Kingan until quick-cured bacon had been marketed for some 18 months and had achieved wide consumer acceptance.

Why They Like It

Two factors vital to good curing are (1) uniformity of curing, and (2) control of the curing formula. Previously, these had been difficult to achieve. Methods of curing bacon depended upon absorption of the curing material by capillary attraction and diffusion. Result: Uneven absorption, areas of concentration, and other objectionable conditions.

When one customer said your bacon was too salty and another said it tasted almost fresh, you couldn't be certain that the bacon didn't come out of the same cure.

Not so with the new process. The liquid cure is injected directly into the tissue in the correct amount, volume of cure being adjustable. And the injection pattern insures 100 percent coverage of the meat.

With a controlled curing formula and uniform injection, the long-desired control of cure has been achieved. Uniform quality and flavor are the benefits.

Incidentally, experiments in the use of monosodium glutamate in the cure to enhance the bacon flavor have been encouraging.

Details of Injector

The basic elements of the injector are two 1,000-lb. stainless steel castings. These are mounted one above the other over the conveyor which feeds bellies into the injector (see photo at left).

The lower casting has 101 precision-bored vertical holes, or cylinders, equally spaced. Plungers operate in these cylinders, and each cylinder has an O-ring seal in a groove near the top. At the bottom of each cylinder is a tapped hole to adapt an injector needle and valve.

The upper casting has a dual function. It supports a plate to which are fastened the 101 vertical plungers. It also serves as a reservoir for the curing solution.

Piston Action

The lower ends of the plungers fit into the holes, or cylinders, in the bottom casting. And they act as pistons when the top casting is moved up and down by pneumatic power. This action forces pickle through the needles on the down stroke and creates a vacuum in the needle cylinders on the up stroke.

Here are some important details of the injector design: Each plunger has a vertical hole in the center of its lower portion, and a transverse hole a short distance from the bottom. This latter hole connects with the vertical hole to form a passage for the pickle. When the plunger is in the up position, the transverse hole is above the O-ring seal and therefore permits curing solution to flow from the reservoir into the plunger cylinder. Then as the plunger is pushed downward, the hole moves into the cylinder and past the O-ring to seal off back flow of the pickle. Pressure thereby built up below the plunger forces the curing fluid through a valve in the needle and into the meat.

Vacuum Re-Loads Cylinder

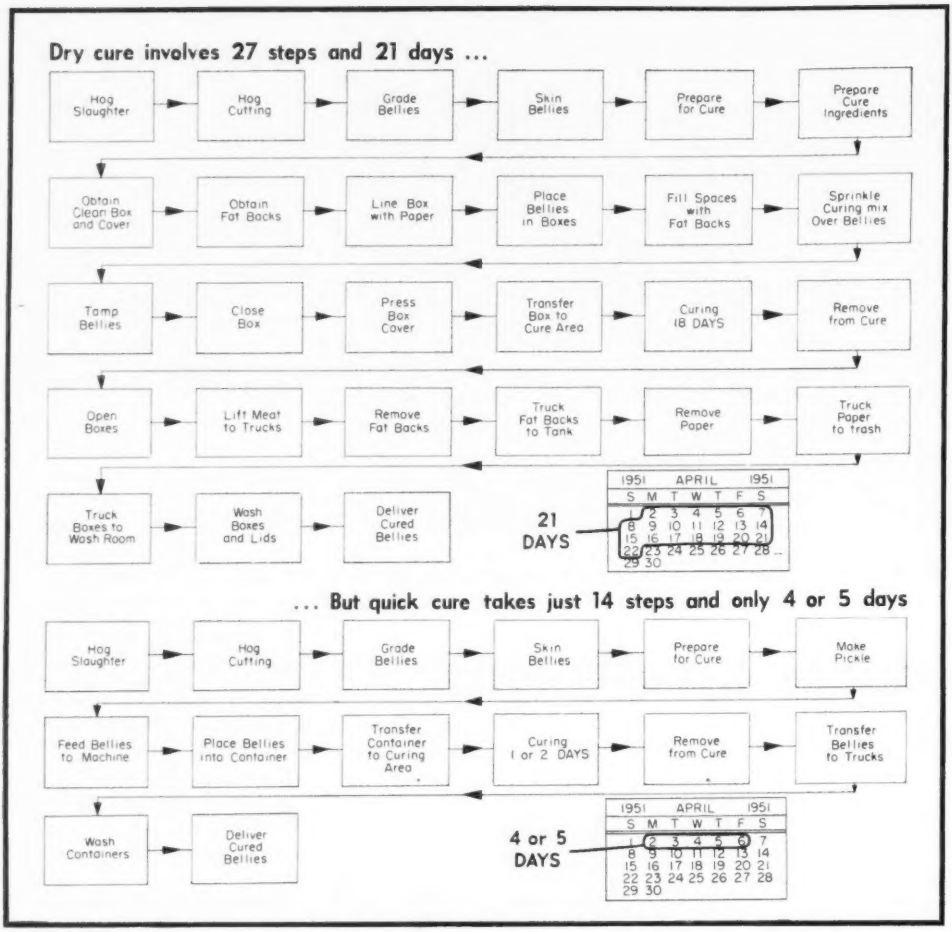
When the plunger rises again, the valve in the needle closes, and a vacuum is created in the plunger cylinder. So when the plunger inlet hole passes above the O-ring and into the fluid reservoir, the vacuum pulls more fluid into the cylinder for the next injection cycle.

To prevent galling between plunger and cylinder walls, the plungers are hard-chrome plated. And their lower ends have a 5-deg. taper. The top ends of the plungers extend through holes in the supporting plate (attached to the top casting) and are fastened by nuts.

Air Lift and Indexing Feed

Another key part of the injection machine is the pneumatically operated platform that elevates each bacon belly until the needles make contact and penetrate the meat.

Bellies are moved onto and off of this platform by the feed conveyor, which consists of two parallel power-driven chains with wooden cross pieces, or pusher bars.


Dry cure involves 27 steps and 21 days ...
Hog Slaughter
Hog Cutting
Grade Bellies
Skin Bellies
Prepare for Cure
Prepare Cure Ingredients
Obtain Clean Box and Cover
Obtain Fat Backs
Line Box with Paper
Place Bellies in Boxes
Fill Spaces with Fat Backs
Sprinkle Curing mix Over Bellies
Tamp Bellies
Close Box
Press Box Cover
Transfer Box to Cure Area
Curing 18 DAYS
Remove from Cure
Open Boxes
Lift Meat to Trucks
Remove Fat Backs
Truck Fat Backs to Tank
Remove Paper
Truck Paper to trash
Truck Boxes to Wash Room
Wash Boxes and Lids
Deliver Cured Bellies
21 DAYS
1951 APRIL 1951
S M T W T F S
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30
... But quick cure takes just 14 steps and only 4 or 5 days
Hog Slaughter
Hog Cutting
Grade Bellies
Skin Bellies
Prepare for Cure
Make Pickle
Feed Bellies to Machine
Place Bellies into Container
Transfer Container to Curing Area
Curing 1 or 2 DAYS
Remove from Cure
Transfer Bellies to Trucks
Wash Containers
Deliver Cured Bellies
4 or 5 DAYS
1951 APRIL 1951
S M T W T F S
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30

FEWER operations, 17 days less time, required for Inject-O-Cure as compared to conventional dry cure.

Feed conveyor, lifting platform and plungers must, of course, be synchronized in their operation. This is done by cams and a Geneva indexing conveyor drive.

A variable-speed drive, operating through a gear speed reducer, rotates the cams and drives the conveyor indexing mechanism.

One cam actuates a valve to operate the pneumatic plunger motor. A second cam operates the valve which controls the injector-platform air cylinder.

One Belly Off, Another On

The feed conveyor indexer is operated by an arm that is moved by a cam. The cam follower on the arm engages into the slot of a spider to rotate the indexing sprocket by one-fourth revolution. This moves the conveyor forward one station, pushing one belly off of the injector platform and another one onto it preparatory to injection.

After the motion is completed, the indexing unit is locked in position by a rotating member attached to the driving arm. This member matches with a concave surface on the spider wheel to hold the conveyor still while the injection operation takes place. The Geneva motion also provides the uniform acceleration and deceleration necessary for feeding meat on an intermittent driver conveyor.

To remove a bacon slab from the injector needles, a stripper plate is provided, having holes through which the needles extend. This plate is pushed upward by the belly as it is forced onto the needles. Then when the belly platform drops, the stripper plate forces the meat off the needles and back onto the conveyor.

Built to handle 10 bellies per minute at top speed, the injector is adjustable to a minimum of 5 a minute.

Amount of curing solution injected also is adjustable—from a maximum of 30 cc. (1 oz.) per needle to 15 cc.

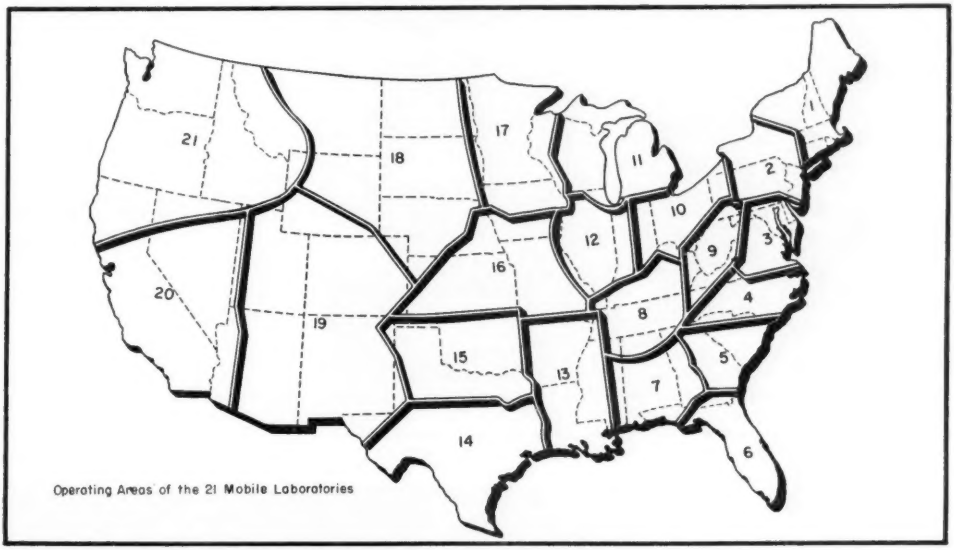
The machine is 10 ft. long by 4 ft. wide. Air pressure requirement is 75 psi. Electrical power is furnished by a 1½-hp., 1,200-rpm. motor.

How It Happened

Research leading to the development of the Inject-O-Cure process by Kingan was inspired by financial considerations. Perfection of a quick cure, the packer realized, would greatly reduce inventory and thereby release the money necessary to finance the size of bacon operation Kingan desired.

21 of these Q. C. trailers . . .

. . . maintain nationwide beverage checks



Operating Areas of the 21 Mobile Laboratories

"Rolling Control" of Quality

To assure uniformly good product in all parts of the country, Coca-Cola operates 21 mobile labs on constant check-call schedule covering more than a thousand plants . . . Production training, other aids described

ARTHUR V. GEMMILL
Assistant Editor "Food Engineering"

Unique is the quality control program of The Coca-Cola Co.

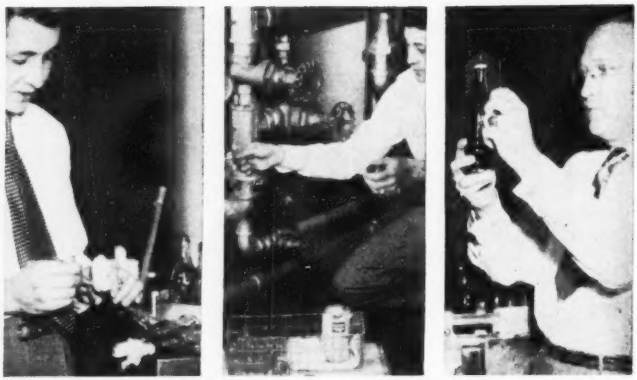
■ **For this program fathers every step, quality-wise, from the basic ingredients that go into the beverage syrup at the ten syrup factories, to the final world-popular product.**

True, quality control over operations in approximately 1,100 bottling plants throughout the U. S.—the great majority of them locally and independently owned—would appear to be a task bordering on the impossible.

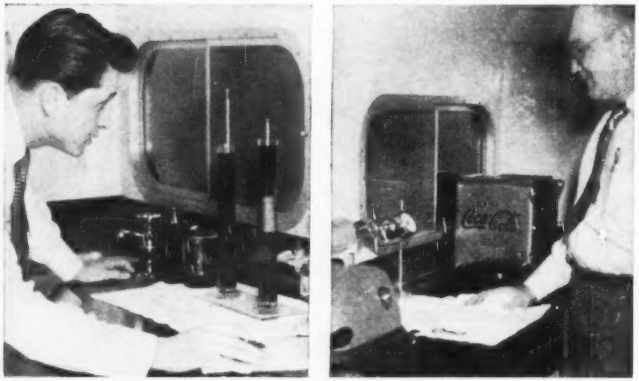
Yet in practical effect it has been

Mobile-Lab Team —Camera Catches One In Action . . .

AFTER PLANT CHECKS →



CHEMIST (left) takes bacteriological samples from washed bottles. Center: He samples water from sand filter. Right: Technician gages height of fill. In addition, operations of all other units in bottling line are carefully scrutinized.



HERE, chemist checks (left) accuracy of syruping machine valves with hydrometer. Right: Technician observes pressure that indicates carbonation content. Particularly, water gets thorough analysis to determine its suitability.

← **. . . COME TRAILER TESTS**

. . . CLIMAXED BY CONFERENCE →

AT COMPLETION of plant survey and lab checks, the chemist and technologist discuss their findings with the plant superintendent. And if any revisions are in order, they make detailed suggestions and recommendations whereby plant management may most efficiently work them out. Finally, a comprehensive report, detailing complete results of the survey, is mailed to Atlanta.

accomplished. How? By constantly "selling" the bottlers on "doing it better"—using a clinical, rather than investigational, approach.

Salient cog in the skillfully integrated program is the Bottlers' Service Department, whose traveling laboratories render on-the-spot technical assistance with multiple production problems.

This department, initiated back in 1941, represents an expansion of the cooperative production service rendered by The Coca-Cola Co. and the Parent Bottlers (company's six primary operators). That the bottlers appreciate this service is demonstrated by the fact that they now produce a universally standard quality beverage.

About the Fleet

A fleet of 21 trailer labs, manned with a field force of 51 expertly trained men, is now regularly covering the entire country (see map), and making complete production surveys of the bottling plants. Geographical density of these plants, and the traveling distances and conditions determine specific routes, but a centrally located headquarters for each mobile unit gives this plan valuable flexibility in case of emergency.

The laboratory crew consists of two men—a chemist or chemical engineer, and a technician who is preferably a mechanical engineer. Several operating areas comprise a territory. Supervision over such territories—there are five—is divided among as many field managers.

Personnel is meticulously chosen, not only for technical qualifications (some 33 universities are represented), but also for attitude, poise and personality so essential to relationships in the field.

A Director-of-Training devotes his full time to a comprehensive schedule for teaching new personnel and for continuous instruction of other employees.

Overall Evaluation

Production surveys embrace every phase of the bottling job and, to develop a complete and thorough picture of conditions in the plants, they are conducted during hours of normal operation.

Findings are tabulated on special report forms that are mailed to Atlanta upon completion of each survey. These forms break down into the following divisions: Water, bacteriological, product and processing, sanitation, mechanical, and miscellaneous.

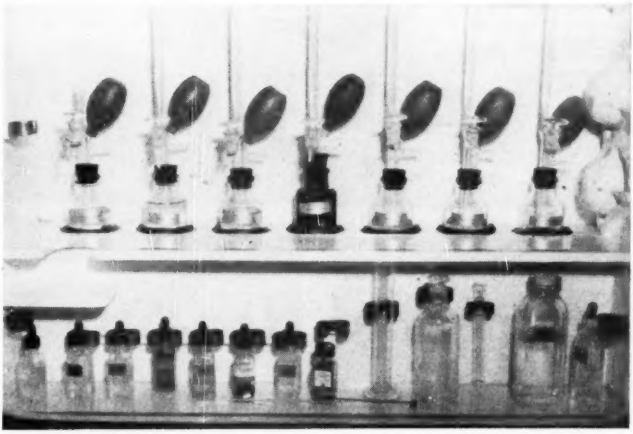
Indicative of the thoroughness of the surveys is the product and processing division report, which requires four pages. Subdivisions are: Bottle washing, syruping, water cooling, carbonating, filling, crowning, mixing, inspecting, and product. Such questions as the following (under syruping) exemplify the fine detail of the checks: Syrup—frequency of receipt, where stored, inventory; Syrup Handling—type and condition of transfer system, pump, strainer and syrup tank, material and type construction of pipe lines and handling practices; Syruping Machine—type and condition of valves, kind and condition of tank lining, sanitary condition of tank, valves, and float; Syrup Content—initial test from each valve, and final test (after adjustment). Similar detail is found in the other checks.

Water is checked by chemical analyses and inspection before and after treatment. And bacteriological tests are used to verify the water's purity. To insure that the bottles are clean, attractive "show windows" for the product, prolonged emphasis is placed on bottle washing and bottle inspection. Bacteriological tests are made at this and other strategic points throughout the processing aiming at highest purity of bottles, materials, handling and machinery.

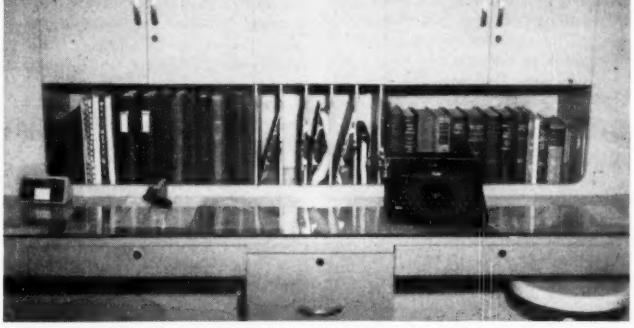
Effectiveness of sanitation procedures and physical performance is verified for all machinery—washers, water coolers, carbonators, syrupers, fillers, crowners, mixers and inspecting machines. The bottled product is tested, not only by noting appearance, taste

(*Turn to page* 145)

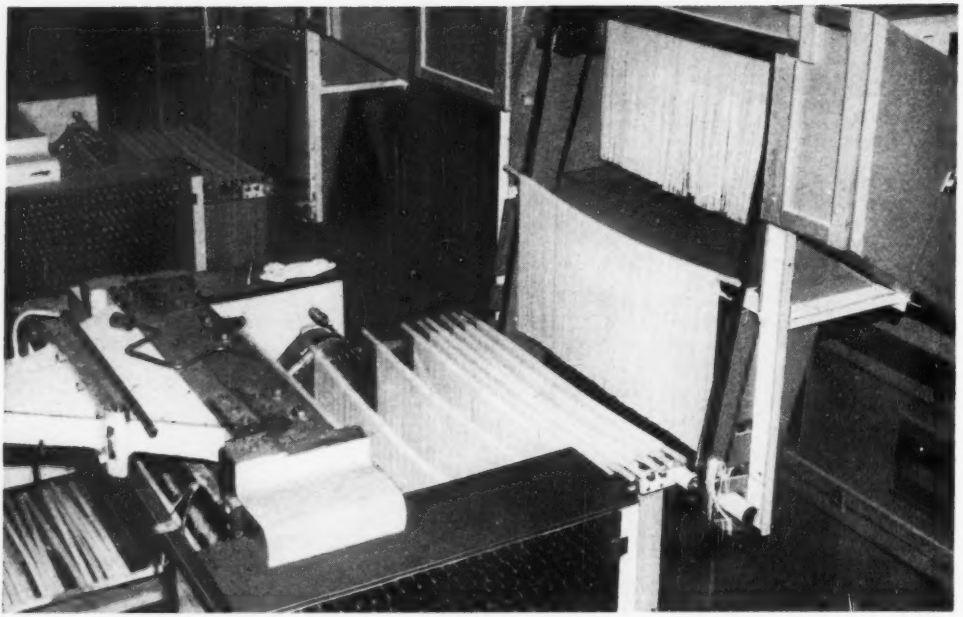
Lab Well Equipped



WATER TESTING CABINET at front of trailer contains apparatus and reagents for the volumetric determination of alkalinity, hardness, sulfates and chlorides, and colorimetric checks for pH, chlorine and iron.



REAR OF TRAILER has glass-top desk, cabinets for stationery and supplies, a small filing cabinet, and factual library on carbonated beverage operation.



EFFICIENT automatic presses extrude dough into strands that are cut to length. Spreader arranges macaroni on drying sticks that are automatically deposited on a chain-belt conveyor going through preliminary dryer (right).

Engineered Non-Stop Output

—brings greater efficiency, higher quality, and better sanitation at La Rosa's macaroni plant . . . Performance of automatic handling units specially cited

JOHN V. ZIEMBA
Assistant Editor, "Food Engineering"

Continuous flow of materials, brought about by improved materials handling practices and the latest automatic equipment, has put higher efficiency into macaroni-manufacturing operations at the new plant of V. La Rosa & Sons, Inc., in Hatboro, Pa. And noteworthy measures have also been taken to keep processing units and equipment parts sanitary to safeguard products all along the line.

The new facility features a two-story plant, plus a seven-story semolina handling and storing section. Throughout, the latest materials and equipment have been combined in a scheme of modern design that assures the most economical operation and maintenance.

Careful placement of equipment permits straight-line production, which requires minimum handling of product. Equipment has also been designed so that it can be quickly dismantled and reassembled, thus speeding cleanups. Many of the efficiency-promoting changes were engineered by Stephen La Rosa, president of the company.

Major Achievements

Eleven developments in this modern plant—really a model for the industry—stand out for efficiency:

1. Short goods are processed continuously—manual handling has been completely eliminated.

2. Manufacture of long goods is also continuous. Only exception is that product is handled in four steps of the process—loading sticks of macaroni coming from preliminary dryers onto racks, rolling racks in and out of rest room and final dryers, stripping macaroni from drying sticks, and weighing long goods for packaging.

3. A Fuller Airveyor unit delivers semolina from freight car through filter collector, scale, sifter, and into storage bins.

4. Enrichment material is continuously proportioned into semolina going to automatic presses.

5. Highly efficient automatic presses mix water and enriched semolina, and then extrude dough through dies.

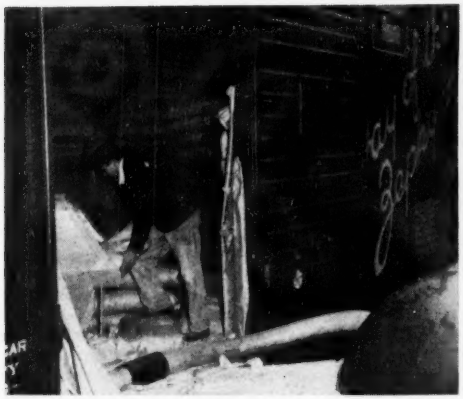
6. Automatic spreaders load strands of macaroni on drying sticks that are conveyed through a preliminary dryer.

7. All dryers (preliminary, intermediate, and final) are constructed of plastic-treated plywood panels that are easy to clean. Panels are also washable and insect-proof.

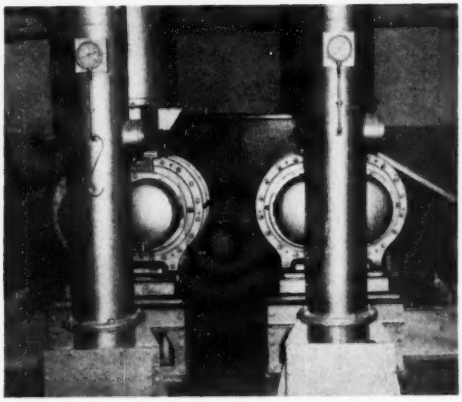
8. Tread plates cover heavily trafficked floor areas, safeguarding them from damage.

9. Floor-level conveyors transport racks of macaroni from rest room to final dryers, and then from drying to stripping rooms.

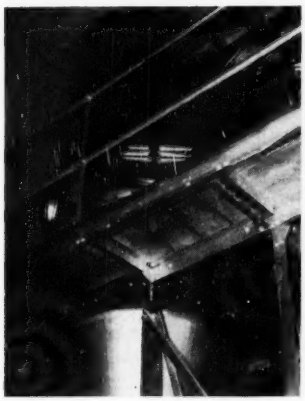
Semolina Brought In Pneumatically, Then Sifted and Stored



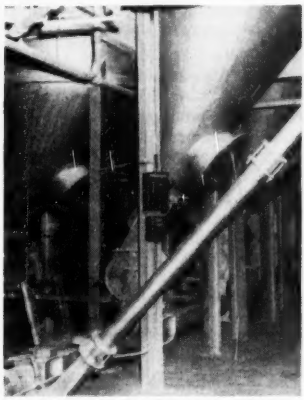
1 **AT START** of pneumatic system, bags of semolina are dumped into portable hopper in freight car.



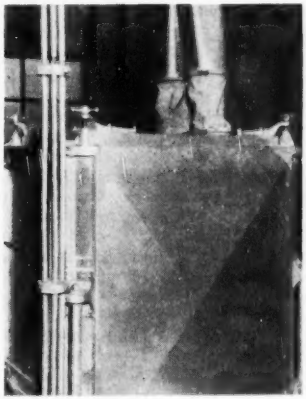
2 **EXHAUSTERS** create partial pressure in pipelines and collectors to draw air and semolina into system.



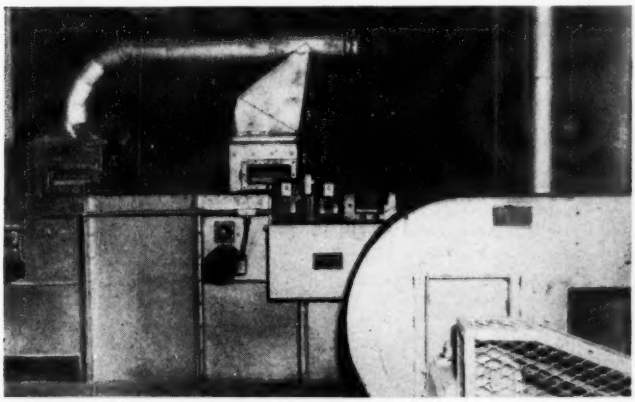
3 **FILTER COLLECTORS** receive semolina coming from cars. It goes to automatic scales, then storage.



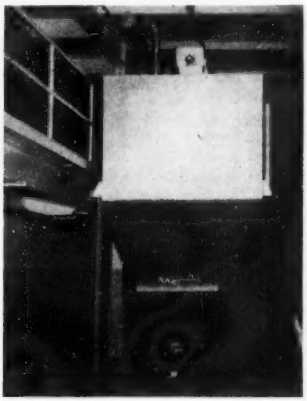
4 **FROM STORAGE** in 1,600-bag-capacity metal bins, semolina is screw-conveyed to pneumatic system.



5 **THEN FROM** collector, semolina goes through air-lock feeder into this automatic gyratory sifter.

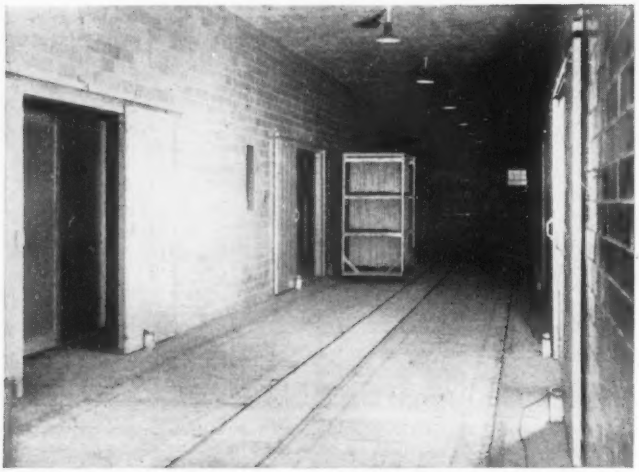


6 **FILTER UNIT,** connected to storage and auxiliary tanks, collects the fine semolina. Action of filter minimizes dust in storage area.



7 **LINE** of 40-ton auxiliary tanks feeding semolina to macaroni presses.

Unique Conveyor Aids Handling of Racks



SPECIAL floor-level conveyors carry racks of macaroni down 180-ft. corridor to final dryers. Conveyors are reversible, and have variable-speed drives.

10. Long goods are machine-cut into length to facilitate packaging.

11. Electric eyes, fitted on conveyors carrying cases of finished goods from storage room to loading dock, prevent damage of product by stopping jam-ups.

Plant Layout

Interior walls throughout processing areas are constructed of smooth-surfaced, easy-to-clean tile. Floors are of concrete.

Floor space at the Hatboro plant is alloted as follows:

Semolina handling and storing. These operations are carried out in a seven-story section of the plant. The seven-story high storage bins occupy a 40 by 180-ft area, and the five auxiliary storage bins are in a 15 by 180-ft. space.

First-floor storing and packaging. The packaging of long and short goods is in a 120 by 200-ft. area; storage for shipping cases, folding cartons, rolls of waxed paper, adhesive, and enrichment material, 80 by 200 ft.; storage for approximately 150,000 cases of finished goods, 90 by 200 ft.; loading platform and garage to accommodate eight 30 or 32-ft. trailers, 50 by 150 ft.

Second-floor processing. Press and preliminary drying room, 120 by 200 ft.; finished drying room for long goods, 90 by 200 ft.; short-goods drying rooms, 80 by 200 ft.; and stripping and rest rooms, 60 by 150 ft.

Lines Are Continuous

Outstanding mechanical and engineering development is the newly designed fully automatic line for processing short goods. At no step in the manufacture of these products is the macaroni touched by hand. Semolina is pneumatically conveyed from freight car to storage bins, from which it goes to auxiliary storage bins, then to automatic presses. Here, enriched semolina is continuously mixed to form a dough that is extruded into the desired shape and cut to size.

Macaroni is next conveyed through preliminary, intermediate, and final dryers. Dried product is then automatically weighed and filled into cartons, that are then glued and sealed. Finally, cartons are automatically collected and packed into shipping cases, that are then machine-glued and sealed.

As stated, production of long goods is a straight-line operation, with products actually manually handled at only four stages of the process. However, significant efficiency promoting changes have reduced handling to a minimum. These changes include an automatic spreader for arranging macaroni onto drying sticks and a floor-level conveyor for transporting racks to final dryers and then to the stripping room.

Special Semolina-Handling System

Two completely sanitary semolina-conveying systems were installed by Fuller Co. engineers. Featured is a closed system with curved piping for delivering semolina from loading dock through Airveyor filter-collector, scale, storage tank, and then sifter. Capacity of each Airveyor system is 15,000 lb. of semolina per hour.

Semolina is received at the plant in freight cars holding approximately 1,000 bags. These 100-lb. multi-wall paper sacks are opened in cars and the contents are dumped into a portable stainless steel hopper at the start of the pneumatic system. Test freight cars, specially designed to eliminate seams and false walls where insects might breed, are now being used to ship semolina from mills to the macaroni plant.

For easy manipulation, a 5-in.-dia. flexible metal hose is joined to a stationary metal pipe for conveying semolina approximately 160 ft. into the plant from the bottom of the bag-dump hopper, which can be rolled to any of five freight cars alongside the unloading dock.

The stationary pipe has branch lines leading to covered openings in the car-unloading platform to permit hose connections at several points. This arrangement also enables connecting the flexible steel conveying hose to the special withdrawal attachments of bulk semolina cars instead of to the bag-dump hopper.

Motor-driven exhausters (40 hp.) create a partial vacuum in the pipe line and semolina collectors to produce the air velocity needed to draw air and semolina into the system. From the collectors, semolina is discharged through a rotary air-lock feeder with vari-speed drives into a 200-lb. capacity automatic Richardson scale and then a 40-ft. screw conveyor that feeds the raw material into seven metal storage bins. These cylindrical, conical-bottomed bins are 9 ft. in dia. and 58 ft. tall. They are constructed of flush-welded steel, and the seamless interiors are coated with a fungicidal paint. Capacity of each bin is 1,600 bags of semolina.

At the bottom of each bin, a gear-operated Pitman arm automatically feeds semolina into a horizontal screw conveyor. An exhauster produces sufficient vacuum to move the semolina through a reclaiming conveying duct and a multiple pipe switch to a collector. The multiple switch arrangement permits connecting the reclaiming line to either of the pneumatic conveying lines. Semolina is then discharged from either collector through an air-lock feeder into an Allis-Chalmers gyratory sifter.

Flexible Semolina Handling

Installation of two filter collectors, with their respective motor-driven exhausters and conveying lines, permits greater flexibility:

1. Semolina can be simultaneously unloaded from either two bag-dump hoppers or two bulk cars into both collectors. But when both pneumatic receiving systems are employed, no reclaiming can be done.

2. One filter-collecting system can be used for unloading semolina from car to storage bins, while the other can be employed for reclaiming from storage tanks to sifter and then to auxiliary tanks.

3. Recirculation—emptying one storage bin to fill into another—is done by merely connecting the reclaiming line to the pipe line-conveying riser feeding either collector. From here, semolina goes through the weigh scale to the distributing screw conveyor that feeds auxiliary bins.

4. If necessary, direct unloading of semolina from car to process may be accomplished by either collecting system, merely by discharging semolina from either collector into the reversible screw conveyor feeding into the sifter, which in turn empties into screw conveyor going to auxiliary or process tanks.

5. The ratchet-operated, 4-speed control of the air-lock feeders under storage bins varies the feed from the bins into the reclaiming line.

Enrichment Addition Is Automatic

From the sifter, semolina goes into a horizontal screw conveyor into which enrichment material (thiamin, riboflavin, niacin, and iron) is proportioned by an Omega Vitaminizer.

This grooved disk feeder continuously introduces small quantities of enrichment material into the semolina. The measuring groove in the face of the disk fills as it passes under the hopper containing enrichment material. Surface of the disk levels the material as it emerges from beneath the hopper. A stationary plow, shaped to fit the groove, removes all of the material as the disk revolves. Delivery of enrichment material is proportional to the number of revolutions of the disk.

The feeder is mounted on a scale to provide a check on the amount of material being delivered. A combination sieve and duster breaks up the material falling from the disk and sifts it into the semolina. Accidental introduction of foreign matter is prevented by the sieve. A scale, graduated from 0 to 100, enables adjustments in the rate of feed. Hoppers are designed to prevent arching and to insure constant feed.

Vitamin-enriched semolina then goes into five 8-ton capacity metal auxiliary or process tanks, from which it is fed into continuous macaroni presses. Process tanks are rectangular in shape with hopper-type bottoms.

Since the accumulation of dust about the storage area is a major problem in macaroni plants, La Rosa's solution was the installation of an automatic Dracco-filter system, which is connected to the seven storage and five auxiliary tanks. Operating under a partial vacuum, this multi-bag filter collects the fine semolina from the twelve tanks, and thus keeps the storage area dust-free.

Continuous Extruding

Uniform-quality macaroni products are continuously manufactured in automatic presses that require minimum supervision. And, all machine parts in contact with dough are made of stainless steel. Moving parts can be quickly dismantled and reassembled, thus speeding cleanups. Bases of all presses are caulked and cemented to the floor to eliminate enclosed areas that might harbor infestation.

At present, there are three Consolidated presses for long goods and two Buhler machine for short goods. Plans call for the installation of eight additional presses—three for long goods and five for the short ones.

Production of both goods in these presses is a five-step operation:

1. Width of a ribbon of semolina fed into a stainless steel mixing chamber is altered by a manually set automatic measuring device. Maximum rate of feed is 600 lb. per hour.

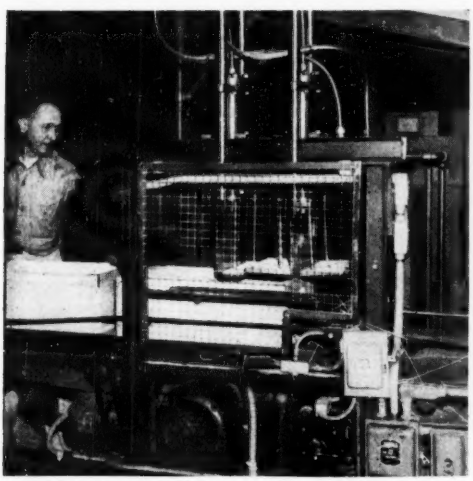
2. At the same time, a uniform stream of water is metered into the chamber by automatic, preset-type flow meters to form dough of the proper consistency. Another measuring device, manually set, controls the flow of water.

3. Kneading is done as a stainless steel worm conveys water and semolina through mixing to extruding units. Proper dough consisteney is indicated by an ammeter that shows electric energy required for mixing. Thin doughs give lower reading than thick ones.

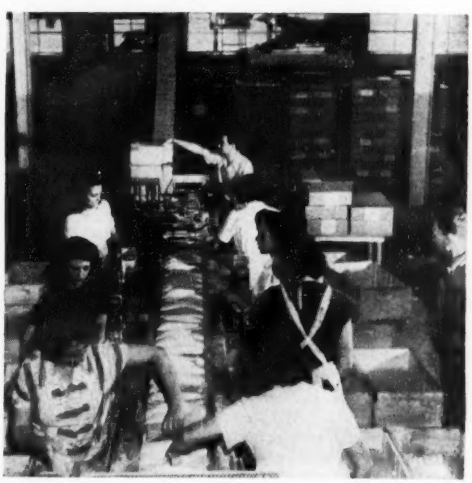
4. Dough is extruded by direct pressure through a die. A gage attached to the extrusion chamber enables an attendant to hold the pressure constant while he operates the press.

5. At the final step—cutting the macaroni—operations differ for short and

Improvements That Speed Long Goods Packaging-Line Operations

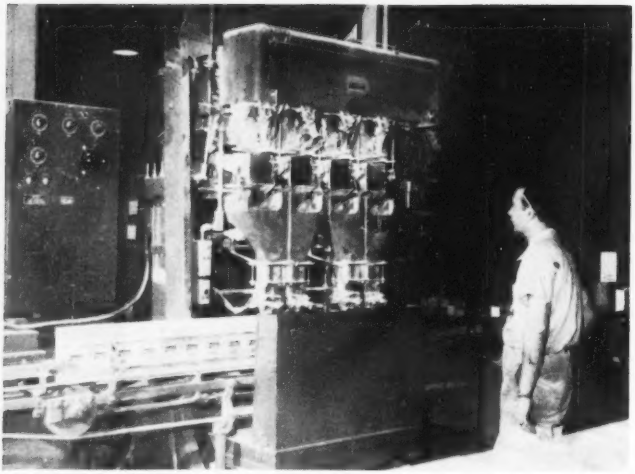


CUTTER chops macaroni into lengths and removes looped heads, thus facilitating subsequent packaging operation.



REDINGTON machine wraps macaroni in waxed paper. Wrapped product goes into cartons, that are sealed.

Short Goods Packaging Is Automatic



PNEUMATIC SCALE unit, with four-scale feeders, weighs and fills macaroni into preformed cartons. Speed of the machine is 90 cartons per minute.

long goods. On the short goods press, a rotating knife cuts the macaroni as it is extruded. Product drops onto a vibrating screen, from which it is flight-conveyed into a metal hopper with a delivery duct. This duct is equipped with an automatic distributing arm that uniformly spreads the macaroni on a wire-mesh conveyor. Macaroni is then conveyed through preliminary, intermediate, and final dryers, and finally goes to automatic packaging machines.

Wire-mesh conveyors carry the short goods five times through the preliminary dryer, which is 8 ft. wide by 9 ft. high by 36 ft. long. Hot air (115 deg. F.) is circulated through the unit by six 20-in.-dia. aluminum fans. Short goods then go to three intermediate dryers, each equipped with five fans. Temperature of these dryers is about 100 deg. F. Size of each intermediate dryer is 8 ft. wide by 9 ft. high by 52 ft. long.

Drying Short Goods

Short goods are dried at room temperature in one of the four final dryers, similar in size to the intermediate units. Each of the final dryers has five fans for circulating air in the dryer at the rate of 6,750 cu. ft. per minute.

To complete the operation on the short-goods line, product goes to twin Pneumatic Scale packaging machines—each with four-scale feeders. Each machine consists of a carton feeder, bottom-carton sealer, four-scale net weighers with vibratory feeders, top-carton sealer, and carton-compressing-drying units. Output from both lines is 180 cartons per minute. Cartons are then automatically collected and packed into shipping cases, that are then glued and sealed by a Standard-Knapp machine. Two additional packaging lines will be installed.

Macaroni Machine-Fed on Sticks

The old manual handling of long goods as they come off the presses has been completely eliminated. This change has been accomplished with the aid of automatic spreaders that arrange the strands of macaroni on drying sticks (hard maple wood dowels), at the same time trimming them to proper length.

Here is how the automatic spreader works: After the drying sticks are manually fed into a magazine, they slide into position. At this point, an automatic electric timing device coordinates three functions, in this manner: First, hooks mounted on two roller chains grab two sticks at a time. Separating the two sticks is a wire-mesh partition that prevents tangling of front and back lines of extruded strands of long paste goods.

Second, as front and back line strands of paste goods are extruded, the two sticks are carried forward so that they are pushed against the center of the strands. At this point, the timer motivates two knives that cut both line of strands coming out of the dies. Cut strands then drop in an arc over the sticks, and they are carried forward to the extension arms of the spreader.

Third, upon passing the extension arms, the strands of macaroni pass over a trimmer that evens up the ends of the product draped over the sticks.

Product is cured as it is carried through preliminary dryers on a zig-zag course for a distance of 80 ft. Each dryer is 8 ft. wide by 10 ft. high by 27 ft. long. Hot water coils keep temperature in each unit at approximately 115 deg. F., and four 20-in. fans circulate the hot air. Capacity of a dryer is 1,000 lb. of macaroni per hour.

Sanitation Gets Accent

Special sanitary features have been incorporated in the new dryers, which were designed by Consolidated Macaroni Machine Co. Top and sides of each unit are constructed of ⅜-in.-thick panels of plastic-treated plywood, which reduce possibility of insect infestation that is more likely to occur in conventional plant-built dryers made of porous and rough-surfaced asbestos, untreated plywood, and tongue-and-groove flooring.

Moreover, insect harborage under wooden molding commonly employed to seal joints in such dryers has been eliminated. Plastic-treated plywood panels are now flush with one another and bolted in place.

Also, panels can be quickly taken apart for speedy inspection and cleaning, and for transfer to other locations in the plant. And finally, bases of all dryers are caulked to the cement floor so that there are no enclosed areas.

Special Panels for Dryers

Food processors seeking a substitute for panels of heavy gage aluminum, stainless steel, or other smooth-surfaced metal for construction of dryers, coolers, and similar units, might well consider this new special plastic-treated plywood material.

Fabricated by Georgia-Pacific Plywood & Lumber Co., these panels consist of cellulose fiber sheets impregnated with 48 to 52 percent (by weight) of phenol-formaldehyde resin. The panels promote cleanliness because dough does not adhere to them. They are also readily washed or vacuum-cleaned.

Maker states the material is 25 times more moisture resistant than ordinary plywood. Moisture has no adverse effects on this treated plywood since the plastic surface eliminates warping and hair-line checking, and greatly reduces grain-raising. Fine hair-line cracks, commonly found in plain plywood, can be a source of infestation.

Problem of preventing damage to concrete floors in heavily trafficked areas—press, rest, and stripping rooms, where racks of long goods are

rolled—has always been troublesome. La Rosa came up with an answer: Tread plates over the floors. Cardboard matting has been placed between plates and concrete floor to absorb shock and to minimize noise created by rolling racks. As a sanitary precaution, plates in contact with walls have been caulked.

Racked long goods are rolled to a rest room. Here, drying is stopped as the macaroni rests for about 2 hr. Resting also permits diffusion of moisture from interior to exterior of product and it prevents subsequent "checking" or "case hardening"—unsightly cracks on the surface of the macaroni.

Improved Handling of Racks

Another major step improving materials handling—adoption of twin floor-level conveyors for carrying racks of long goods to and from final dryers—is a development of Stephen La Rosa, president of the company.

Two hard-maplewood slatted chain-belt conveyors were installed by Link-Belt engineers for delivering racks to dryers on both sides of a 180-ft. long corridor. Conveyors are reversible and have variable-speed drives. They are 4 ft. wide by 185 ft. long.

This modification has brought about notable savings in time and labor. Formerly, four men wheeled racks from rest room to final dryers and then to the stripping department. Depending upon production, only one or two men are needed to handle racks. If production is running slow, speed of a floor-level conveyor can be reduced so that one man can remove racks from the rest room, feed them onto the conveyor, and then roll them into one of the drying rooms. On the other hand, when production mounts, speed of the conveyor can be increased to permit one man to load racks onto it while another feeds them into dryers.

Transporting of racks from dryers is done by reversing the direction of travel of conveyors. Racks are then taken out of dryers and placed on one of the conveyors, that then carries them to the stripping room.

By locating the stripping operation adjacent to the press room, considerable time and labor are also saved in delivering drying sticks to automatic spreaders.

Stripping is a hand operation. Girls remove macaroni from drying sticks, two stickloads at a time. Macaroni is loaded into wooden boxes, which are then conveyed to a Redington packaging machine on the first floor. Empty sticks are put into wooden bins mounted on casters, later to be rolled to automatic presses.

Machine-cutting of long goods into two lengths and removal of looped heads (portion of macaroni curved over drying stick) has greatly facilitated the packaging operation. Strands of macaroni are now straight and without bent ends. And the more evenly lined-up strands of macaroni can be fed into paper-lined conveyor pockets of the packaging machine with little danger of jam-ups.

For More Efficient Packaging

Each box containing 15 lb. of macaroni is manually fed from a roller to a canvas-belt conveyor going to the cutter. Here, there are two hydraulically operated knives, spaced 8½ in. apart. One knife chops off the looped ends, which are later reground and fed back into the presses. The other knife cuts the macaroni into two 8½ in. lengths.

Packaging of long goods is automatic, except for two steps—weighing and placing the macaroni in conveyor pockets lined with waxed paper wrappers. The latter operations are performed by eight girls.

The Redington machine cuts roll-fed waxed paper and feeds it to a conveyor with pockets corresponding to the length and width of the carton. Girls put 1-lb. amounts of macaroni into the pockets lined with the wrappers. Paddle-pushing mechanisms, at both ends of the pockets, line up the ends of the macaroni so that none of the strands protrude and interfere with the wrapping operation.

Macaroni is next machine-wrapped and delivered to the cartoning station. Here, cartons leaving a magazine are set-up and then transferred to the pockets of the carton conveyor, where the waxed-paper-wrapped macaroni is inserted into them. Both ends of the cartons are folded and then glued with a fast-drying adhesive. Cartons are flight-conveyed through a compression belt for sealing.

Output of the Redington machine is 90 cartons per minute. Plans call for the installation of three additional units.

As on the short-goods line, cartons are automatically collected and packed into shipping cases, that are then machine-glued and sealed.

Better Die-Cleaning

Probably the most difficult task in a macaroni plant is cleaning the dies. La Rosa's does it this way: Dies are soaked overnight in a stainless steel tank filled with tap water. Next, they are washed in a special Consolidated cleaning machine, where each die is agitated in a cold-water bath by a stainless steel roller chain for approximately 3 hr. During this time, water from four nozzles is pressure-sprayed (150 psi.) on the die. Finally, each die is scrubbed by hand and coated with an odorless, tasteless white oil.

Dies are cleaned in a separate room, with tile walls and floor. A sloped floor facilitates drainage of water used for washing the room.

Installation of 15 sets of electric eyes on conveyors feeding cased goods from storage room to loading dock simplifies the handling operation and, at the same time, prevents damage to cases due to jam-ups. These eyes, acting as limit switches, stop the cases if they jam-up during truck-loading operations.

"Eye" Prevents Damage to Cased Goods

CONVEYOR carrying cases of macaroni from storage area to loading dock is equipped with electric eye (arrow) that stops flow when cases jam-up.

This Superior Quality and Texture Results . . .

THIS ICE CREAM won preference of both consumers and experts. Credited is new quick freezing from all sides.

BETTER ICE CREAM

By Fast, Capacity-Plus Hardening

In specially engineered unit, packages slide through refrigerated channels and ice cream is frozen within hour. Uniform heat-transfer improves body

C. R. HAVIGHORST
Associate Editor, "Food Engineering"

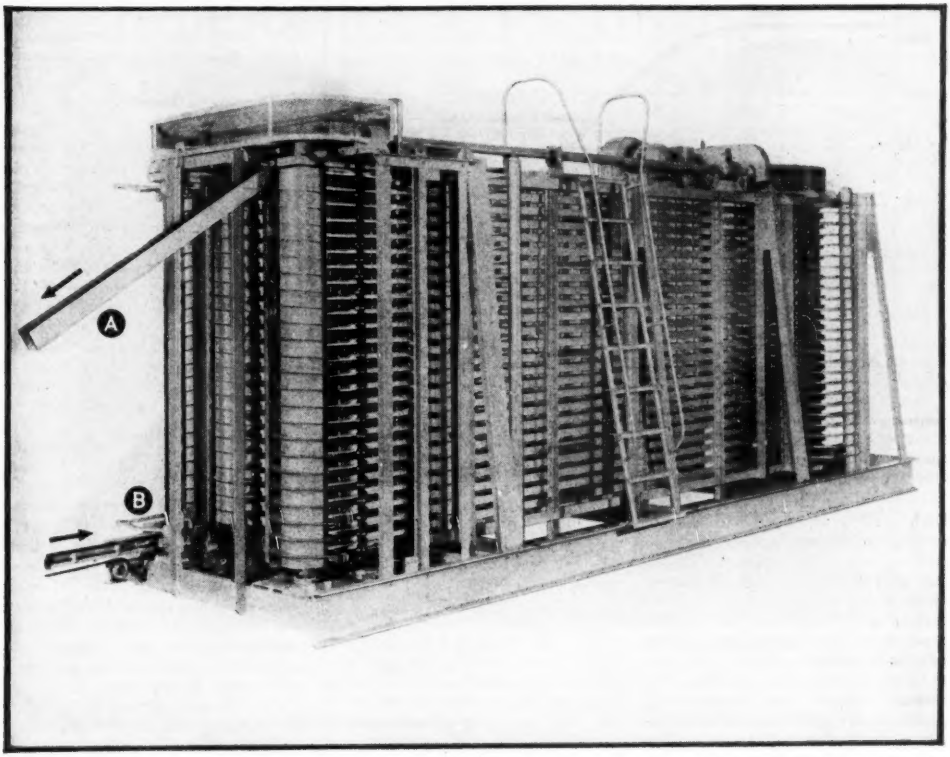
Increases in capacities ranging from 275 to 300 percent have been reported in several Western ice cream plants by installation of fast new type, continuous hardening units to replace existing facilities for freezing pint and quart ice cream packages.

And most notable, the quality and texture of the finished product have proved superior—as indicated by "blind" tests made in several plants, with different mixes.

Each test consisted of running eight different standard flavors, with half of each flavor diverted to the existing hardening room and half to the continuous hardener. Enough samples were run so that each flavor could be cut at three different times: The first cutting was made on the second day (when the product would normally go to the trade), the second after 5 weeks of storage, and the third after 6 weeks of storage plus 10 days in the retailer's cabinet.

Tests were made by experts and, also by customers selected at random. In all three cuttings, the experts chose as best the product hardened by this machine. And the customers all picked the same products as the experts, with the exception of only a single sample in the third cutting. In this test, they picked seven of the machine-hardened flavor samples unanimously but disagreed on the eighth.

. . . When Ice Cream Is Frozen in This Unit



CONTINUOUS hardener, showing discharge (A) and infeed (B). Unit is 7½ x 27 x 9½ ft. Capacity: 300 gal./hr.

Two factors are largely responsible for the vastly improved quality and texture. They are: The shortened hardening time (48 to 54 min. at —30 deg. F., as contrasted with hours previously required), and control of volume in the freezing unit (with cold air blast hardened packages found to expand up to 13 percent during freezing).

The machine was originally designed for the quick freezing of fruits and vegetables (p. 72, Mar. 1948 FI). It has now been rebuilt to accommodate either standard U. S. No. 2 pint or quart cartons. Capacity of each of the units now installed is 300 gal. per hr. Temperature of the ice cream in the center of the packages at the time they leave the hardening unit is approximately 5 deg. F. However, this temperature continues to fall, reaching —5 F. or lower after 20 min. in storage (see chart).

Close Contact With Refrigerant

This rapid heat transfer is accomplished by sliding cartons through channels comprised of refrigerated metal plates. These freezing channels are made from 98 percent aluminum alloy billets extruded under tremendous pressure through a hardened steel die which forms simultaneously the outside contour and the central hollow. As illustrated in an accompanying photo, the refrigerant is pumped through the hollow centers.

Stacked 25 High

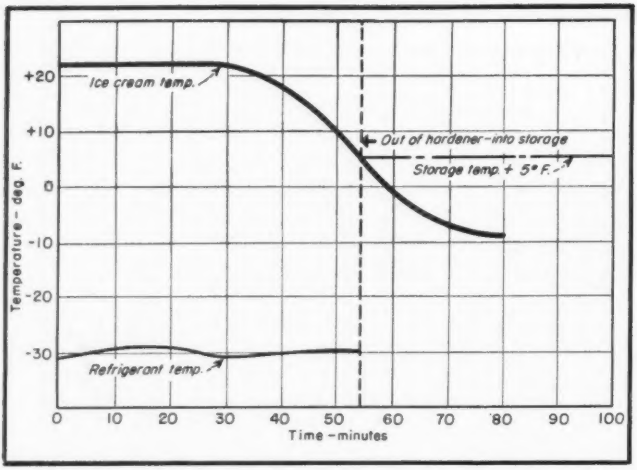
These sections are so designed that, when stacked into place in the machine, the bases of the upper channels form the tops of the lower channels and flanges form the sides. This provides intimate contact for the cartons with the metal as they are moved through the channels by the pusher-arms.

Sections are each 15 ft. long and are stacked 25 high, forming 24 freezing channels. Two such stacks are spaced parallel about 3 ft. apart. In the center and at each end of the hardener are vertical shafts with sprockets top and bottom. These sprockets provide the power for the progressing mechanism. A special linkage, operated by these sprockets, is connected by vertical bars. Each bar is equipped with 24 pusher-arms each of which fit into a channel in the stack.

How Unit Operates

Cartons, filled with "continuous frozen" ice cream are conveyed to the hardening machine on a belt which deposits them on a timed chain. This chain delivers the packages onto a stand that reciprocates vertically. As the twin-elevating screws revolve to a receiving position, the stand rises and the cartons are picked up by the bottom flights of the screws. To force the cartons to rise on the screw flights, a vertical bar is located in the center, between the two screws against which the cartons ride as they rise upward on successive flights.

At the moment the screws have elevated 24 cartons to positions opposite the entries to each freezing channel, this vertical bar pushes them out of the screws and onto receiving shelves.



ICE CREAM CURVE shows how temperature in exact center of quart package changes as it progresses through hardening unit. Temperature continues to drop for more than 20 min. after brick leaves unit and is stored at +5 F.

Each shelf is equipped with an individual, horizontally-operated pusher-bar that is in properly timed relationship with the freezing channel pusher-arms. These horizontal bars move the cartons into the path of the pusher-arms, which then convey them into the freezing channels.

At the far end of the hardener, the cartons emerge onto semi-circular plates and are guided around to the return bank of channels. As the cartons reach the exit, they are ejected into an elevating-screw, from which they drop, one at a time, into a chute near the top of the hardener. From here the cartons go to the packaging room to be assembled into desired units for subsequent distribution.

Cuts Insulation Needs

The unit, which is 7 ft. 6 in. wide by 27 ft. long and 9 ft. 6 in. high, is installed in an insulated room providing 18 in. to 2 ft. access all around and on top. The small amount of space required for this unit, compared with that of a hardening room equipped with circulating cold air (the type commonly used for ice cream hardening) is of importance. Significant, too, is the fast rate of hardening in this machine when compared to the several-hour period (sometimes overnight) required in normal air-blast hardening rooms.

Aids Continuous Operation

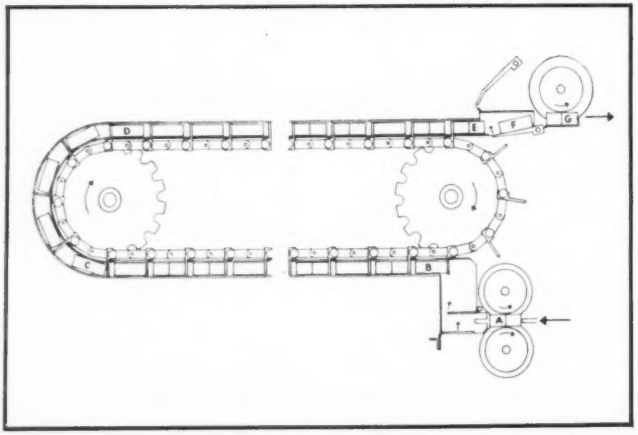
Use of this hardener in connection with a line of machines that set up, fill, and close brick cartons makes possible a fully automatic production line. From mix tanks, the product moves through continuous freezers, automatic fillers, and into the continuous hardener. On leaving the unit, the cartons may be cased, wrapped, or basketed for distribution or storage.

Savings result from the compactness of the unit and the decreased inventory requirement, since the hardened ice cream is available for distribution within one hour from the time the freezers are started.

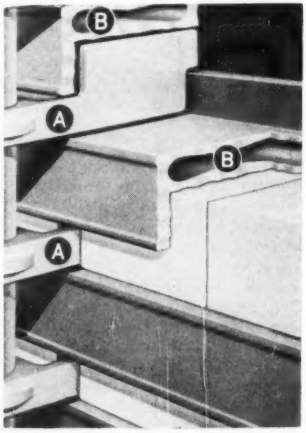
The 300 gal. per hr. unit described here requires approximately 8 tons of refrigeration when operated at an evaporating temperature of −30 deg. F. A larger unit, rated at 450 gal., is now available. When operated under conditions similar to the above, it needs approximately 12 tons of refrigeration. Either ammonia or Freon can be used. Machines may be adjusted to operate slower or faster than the rated capacities to accommodate a range of refrigerant temperatures.

The 300 gal. machine is driven by a 3 hp. motor and the 450 gal. unit by a 5 hp. motor. Defrosting is required about once each week. Maker: Food Machinery & Chemical Corp., San Jose, Calif.

Schematic Flow . . . Channel Details



FILLED CARTONS enter elevating screws at (A), move into refrigerated section (B), and emerge from first section at (C). They enter return section at (D), reach front of the machine at (E), are transferred to elevating screws at (F), and discharge to chute at (G).



BARS (A) push cartons through hardening channels. Note hollows (B) in centers of individual sections that are stacked 25 high to form complete unit.

A SPECIAL FOOD ENGINEERING REPORT

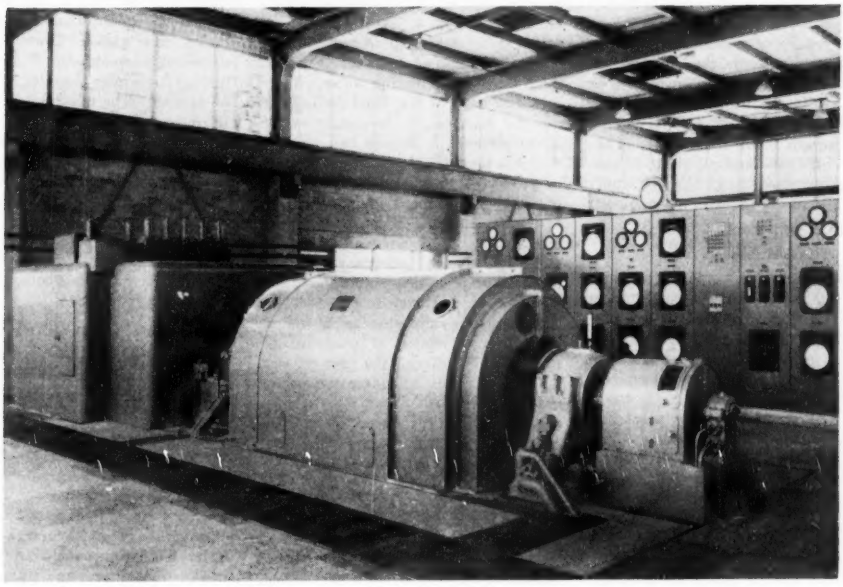


FIG. 1. HERE, Corn Products Refining "makes its own." Employed is an Allis-Chalmers 6,000-kw. steam turbine generating unit (above), of non-condensing automatic-extraction impulse-reaction type.

POWER—Buy It? Or Make It?

How to determine whether generating your own power will pay—and if so, the way to do it most effectively . . . Steam demand cited as major factor

C. W. BLOEDORN
Southeast Representative,
Steam Turbine Department,
Allis-Chalmers Mfg. Co., Milwaukee

To put it briefly, the food manufacturer's choice of buying or making his power comes down to this:

■ **Where he needs a considerable amount of steam for his processing, it is usually most economical for him to generate his power as a byproduct. On the other hand, where he needs little or no process steam, or where waste heat boilers are not used, he generally will find it much more economical to purchase his power.**

In considering the relative advantages of purchased power vs. generated power, the cost per kilowatt usually is the main consideration along with the basic gage of steam demand.

Moreover, initial investment, space requirements and availability of skilled personnel also are important factors.

Utilities provide excellent service and the continued decrease in the cost of electric power supplied to the consumer has aided industrial progress. In some cases, where the industrial plant generated steam for process and purchased power, a mutually satisfactory agreement was worked out with the utility company. Operating in this manner, the industrial plant generated some of its own power economically and still maintained a tie line with the utility company which insured a dependable source of power at a lower cost than essential standby equipment.

In some cases, because of the nearby location of a public utility steam-electric generating plant, arrangements have been worked out whereby the utility supplied steam as well as power to the industrial plant at an economically attractive price.

More Electrical Equipment Used

With productivity in the food industry increasing considerably at the present time, entailing improved methods and modern equipment, power demands are exceeding previous estimates. This growing demand is brought about by expanded facilities involving use of more electrically driven equipment and greater lighting,

heating, refrigerating and air conditioning loads. In many cases process steam demands also have increased.

According to recent Federal Power Commission statistics, the food industry ranks with the chemical, iron and steel, non-ferrous metals and paper industries as one of the five largest users of electrical power among major industries in the United States. Over 10,000,000,000 kwh. of electric energy per year are required in the food industry. Of this amount, about 82 percent is purchased and the remainder generated in the industry's own power plants.

Individual Study Required

In planning an industrial power plant, the factory's needs must first be studied. Each power plant must be considered on its individual merits, because each factory has different requirements for steam and electricity. In order for an installation to be economically successful, the plant heat balance and power generating equipment must be coordinated so that the power demand can be met insofar as possible by generating byproduct power. This involves, among other factors, the proper selection of boiler pressure and temperature.

Savings can be made by using the proper type of steam turbine in a specific industrial plant. If the process steam and the electrical loads are balanced so that a non-condensing turbine can be used, the thermal efficiency of the installation, including boiler losses, will be about 75 to 80 percent, as compared with about 35 percent for the very efficient large central stations.

High efficiency is attainable because credit is allowed for the useful heat in the exhaust. This credit is justified because the necesary heat to the process must be furnished whether the power is purchased from a utility company or generated in their own plant.

When steam is used to generate power alone with no requirement for process steam, approximately one-third of the heat in the steam is converted into useful power while the other two-thirds of the heat is lost in the condenser circulating water. While in a few cases it has been possible to use the warmed-up circulating water in the process, it readily can be seen why it is economical to exhaust entirely to process, or bleed as much steam as possible from condensing automatic extraction turbines when their use is required.

A high thermal efficiency also can be obtained when non-condensing automatic extraction turbines are used. In these cases the exhaust steam as well as the extracted steam is used in the process. Therefore, the power cost will be very low whenever the power balance is such that "byproduct power" can be produced by a non-condensing automatic extraction steam turbine (see Fig. 1), or a non-condensing turbine (Fig. 2).

Process-Power Steam Needs

Turbines of this type are most practical when the process steam demand always exceeds that required to meet the electrical power demands. With this arrangement, steam over and above that required to generate the power demand is by-passed around the turbine and put through a reducing valve and desuperheater. Frequently, even under the most ideal heat balance arrangements, there will be times when the power load will be high and the process steam load will be low. Under these conditions, the deficiency in power must either be purchased from a utility company or produced from steam going to a condenser.

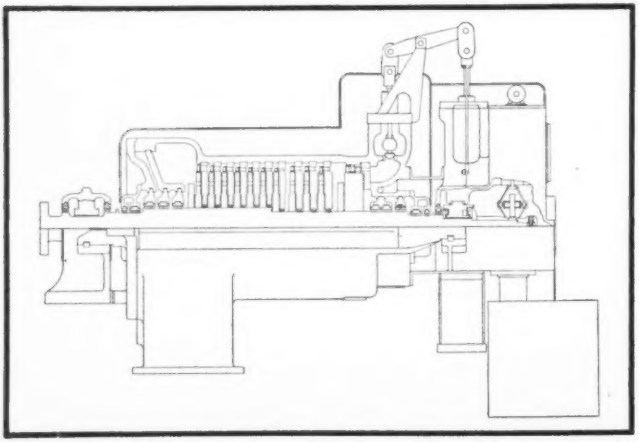


FIG. 2. POWER COST is low when this non-condensing turbine can be used.

For example, in many food plants in the summer months the steam load is reduced because none is required for plant heating, but the electrical load is increased because of the refrigerating and air-conditioning requirements. During this period power must be purchased, or condensing turbines used. During the winter months, the opposite is true. The electrical load drops off because of the reduction in refrigerating load, but the steam demand increases because of the rise in heating load requirements. Under this condition it is impossible to use all the power that could be generated as a byproduct of the process and heating steam demand so steam must be by-passed through a reducing and desuperheating station.

Temperatures and Pressures

An industrial power engineer interested in the installation of a non-condensing steam turbine usually knows the amount of steam required for process and heating and the pressure at which it must be supplied. Therefore, he wants to determine the power that can be generated from this steam and, of course, this is related to the initial pressure and temperature. The initial temperature selected also will depend upon the temperature requirement of the process or the type of fittings or piping in the existing low pressure system.

The curves shown in Fig. 3 give approximate values of power obtainable per 10,000 lb. of steam per hour for various back pressures, throttle pressures and temperatures.

As an example of the use of the charts in Figs. 3 and 4, assume that a plant requires 150,000 lb. of steam per hr. at 25 psig. pressure, and that throttle steam at 250 psig., 600 F. is available.

By using the chart (dashed lines Fig. 3), it is found that 385 kw. per 10,000 lb. of steam can be obtained. For 150,000 lb. per hour, total kilowatts are determined as follows:

$$\frac{385 \times 150{,}000}{10{,}000} = 5{,}775 \text{ kw.}$$

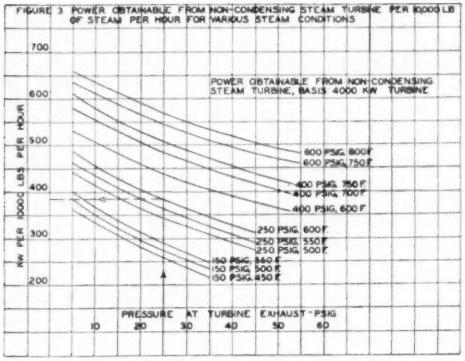
Since the nearest standard rating is 6,000 kw., a correction should be applied from the curve, Fig. 4. The correction from this chart, as indicated by the dashed lines, is 1.012. Then, the corrected approximate power obtainable is:

$$1.012 \times 5{,}775 = 5{,}844 \text{ kw.}$$

The curves in Fig 5 give the approximate quality or superheat of the exhaust steam for various steam conditions. These curves are within an accuracy of 20 deg. F. for superheat and 1 percent moisture for turbines in the range of 1,500 kw. to 7,500 kw.

Granted, then, that the require-

Curves for making power study — Figures 3 through 8



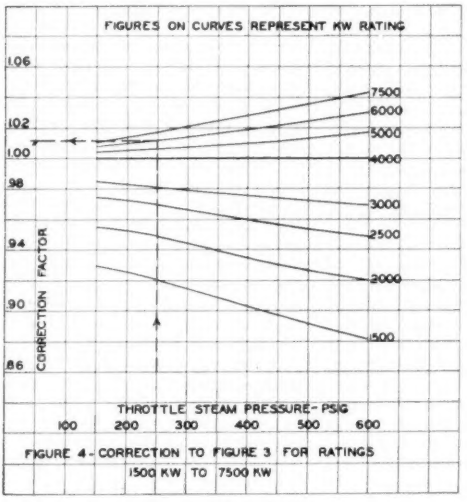
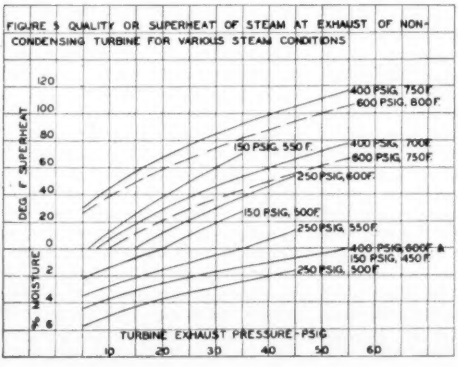


FIGURE 4 - CORRECTION TO FIGURE 3 FOR RATINGS 1500 KW TO 7500 KW



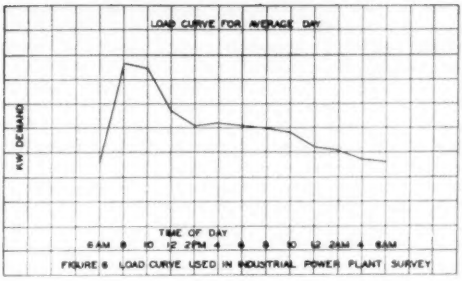


FIGURE 6 LOAD CURVE USED IN INDUSTRIAL POWER PLANT SURVEY

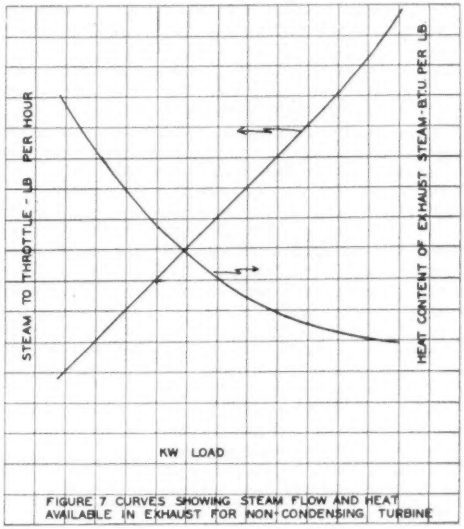
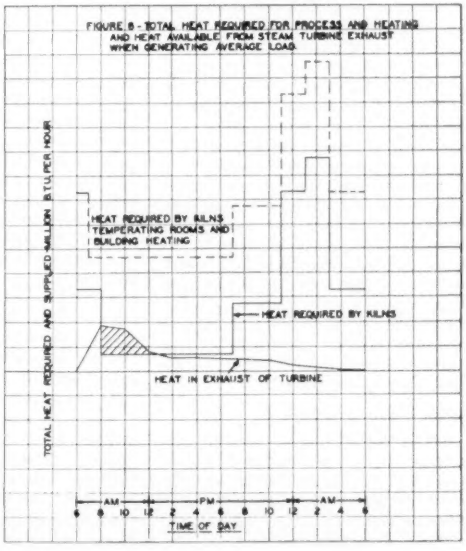


FIGURE 7 CURVES SHOWING STEAM FLOW AND HEAT AVAILABLE IN EXHAUST FOR NON-CONDENSING TURBINE



ments for each plant are different and a survey is necessary to determine the proper economical equipment to install, the importance of keeping records can be realized. When a new power plant, or an extension to an existing plant, is contemplated, adequate records are essential so that an intelligent analysis can be made. Whether or not byproduct power is being generated, the keeping of accurate records is important, not only so the manufacturer may know what he is getting for his money, but to enable the operator to determine the condition of the equipment.

Usually, with the records available, a graphical study can be made to indicate how much of the electrical load can be generated as a byproduct of the process steam load. Figs. 6, 7 and 8 show some of the curves used in a power survey for a malting company. Fig. 6 is one of several load curves used to determine the size turbine required. Fig. 7, then, shows the steam required and the heat available in the turbine exhaust for the steam conditions selected. The heat required for process and heating was plotted as shown in Fig. 8. And using the data from the curves in Figs. 6 and 7, a curve showing the heat available in the steam exhausted from the turbine was superimposed on this chart.

In this particular case, the steam demand (with the exception of a short period during the summer months) always exceeded the amount necessary to generate the power requirements even when relatively low pressure steam was used. Under this condition it was found most economical to use a non-condensing turbine and maintain the tie-in with the power company for standby purposes.

When the original study was made, it was found, as shown by the shaded portion in Fig. 7, that for a short time in the morning during a brief period during the year, excess steam was available. It was found that even if the use of purchased power were not contemplated, and it became necessary to exhaust steam to atmosphere during this short interval, the installation of a non-condensing turbine was more economical than installing a condensing turbine with all the necessary auxiliary equipment and cooling water requirements. However, a change in the electrical load resulted in shifting the peak load to coincide with a period of higher steam demand.

When Investment Is Justified

After determining the power generating equipment required to best meet the plant's conditions, an estimate of the savings effected easily can be made to decide whether the investment is justified. In some cases a net return of 20 percent or less can be justified, whereas in other cases this figure must be 40 percent or higher. (This percentage is the ratio of the estimated annual saving in the cost of fuel and power to the estimated total investment cost.) The study for the above-mentioned malting company indicated an annual return of approximately 30 percent on the investment.

In another case, where the power demand at times exceeded the amount that could be generated by the turbine unit passing only the steam necessary for process, it was found to be economical to operate a small non-condensing turbine in parallel with the power company and use a steam accumulator. This turbine generator unit is equipped with a special regulator which operates in conjunction with the turbine governor speed changer motor in order to maintain any predetermined amount of power from the public utility tie-line. Under some conditions when the process or heating steam demand is low and the reducing station is not in use, the turbine operates under control of a back pressure regulator and exhausts excess steam into the accumulator. When the pressure in the accumulator builds up, the back pressure regulator acts to reduce the load on the turbine and the balance of power required is supplied by the utility. Under this condition, the tie-line regulator is out of service.

Process vs. Power Steam

During the greater part of the time, however, the process steam demand exceeds the amount required to generate the necessary kilowatt load, and the reducing station between the boiler and the process steam line is in use to supplement the steam supplied from the turbine exhaust. Here, the turbine back pressure regulator is locked out of service and the special tie-line regulator is adjusted to maintain the desired division between purchased and generated power.

In this plant, savings were made by having modern equipment tied in thermodynamically with a power-process arrangement taking full advantage of the byproduct possibilities and still maintaining flexibility of operation. Automatic operation, through the use of the tie-line regulator, back-pressure regulator, and automatic control on the reducing station, keeps operating costs at a minimum.

A corn products plant has achieved a very good power and steam balance through the use of a single non-condensing automatic extraction steam turbine. This particular unit, shown in Fig. 1, operates with initial steam conditions of 400 psig. 700 F., with steam extracted at 150 psig. and exhausted at 10 psig. for process. There is a tie-in with the power company, but the amount of power contracted for is not sufficient to meet the needs of the entire plant. The amount of power available from the power company tie-in is about 1,000 kva. and is only sufficient to keep some essential equipment running and to furnish the lighting necessary in event the power generating equipment should be down. This tie-in also supplies the power necessary when starting up the plant after a shutdown.

Reliability of power supply is of utmost importance in the majority of plants in the food industry, and steam turbines have proved to afford this high reliability. Plants that have no standby source of power, however, frequently have a seasonal shutdown, at which time the power generating equipment, as well as the other equipment is inspected and serviced.

Large Steam Users

The sugar industry, like the corn industry, requires a large amount of process steam, and here non-condensing steam turbines can be used to great advantage. But in many other plants, flexibility of operation can be obtained by using condensing automatic extraction turbines to provide the required power demand when the process steam load is reduced.

Several breweries, for instance, have successfully used steam turbines of the automatic extraction type. Fig. 9 shows schematically the arrangement used in one large brewery. Fig. 10 shows a section through a condensing single automatic extraction turbine of the type used for this application.

In this case illustrated by the heat balance sketch (Fig. 9), the initial installation consisted of the two 2,500-kw. generating units and the 5,000-kw. unit will be installed in the near future. A quick glance at this diagram might indicate the possibility of using a turbine of the double automatic extraction type supplying steam at 125 psig. as well as 45 psig. This was given consideration at the time the addition of the 5,000 kw. turbine was contemplated, but a careful study showed the single automatic extraction turbine to be much more practical.

Before installing a turbine of the double automatic extraction type, a careful survey of plant requirements and anticipated future requirements should be made because the initial investment is greater with this type of equipment. Governor control of the turbine is more complicated than that of the single bleeder, and the turbine is designed and proportioned for very specific conditions. If requirements vary from the design conditions, considerable loss in efficiency may result.

In new plants, but especially in additions being made to an existing plant, where process steam is required at two, or even three, different pressures, an arrangement can frequently be worked out that will eliminate the use of the complex double bleeder and possibly give a more flexible arrangement. The proper turbine application often will pay for itself in a relatively short time, but an improper application can be a liability. Therefore, because constant improvements and new developments result in changes in industrial process steam and power demand, special applications should be avoided unless the investment can be written off in a very short time.

In anticipating possible future production, it should be remembered that a year or two may be required to place the power plant into operation after contracting for the equipment. There are many cases where, by carefully selecting the type of turbine, sufficient flexibility was obtained to take care of changing conditions.

Extraction Flow Discussed

A single automatic extraction turbine has the maximum of flexibility when it is proportioned so that it will carry full load with the bleeder pressure maintained but with no steam bled. This results in a machine which will carry its rated load with extraction from zero to the maximum specified. In order to stay within reasonable design standards, the maximum design extraction flow should be an amount such that the flow ratio (ratio of maximum throttle flow to full load zero extraction flow) does not exceed 4.0. A machine so proportioned may not be as efficient under certain extracting conditions as a machine that is proportioned for a given amount of extraction which is close to a normal operating condition. But it may prove to be most economical over the life of the machine because of a change in the process which it supplies.

Compare the performance shown by the chart in Fig. 11 with that in Fig. 12. Fig. 11 is an extraction performance chart for a standard unit, whereas the other chart shows the performance obtained when a turbine is designed for a special condition. On the chart in Fig. 11, point "A" indicates the amount of steam required at the throttle when the turbine is carrying full load with no steam being extracted but with the extraction pressure being maintained. The line labeled "total extraction" indicates the output of the unit when the entire throttle flow, with the exception of the steam required to "cool" the low pressure blading, is extracted.

In this case, full load can be carried under this condition, but still the ratio

Brewery heat balance and turbine used

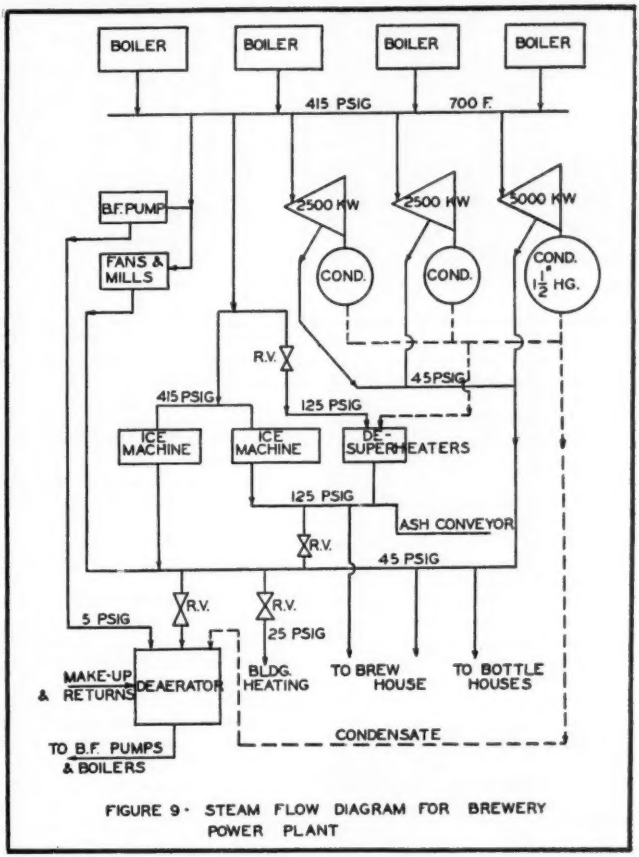


FIGURE 9· STEAM FLOW DIAGRAM FOR BREWERY POWER PLANT

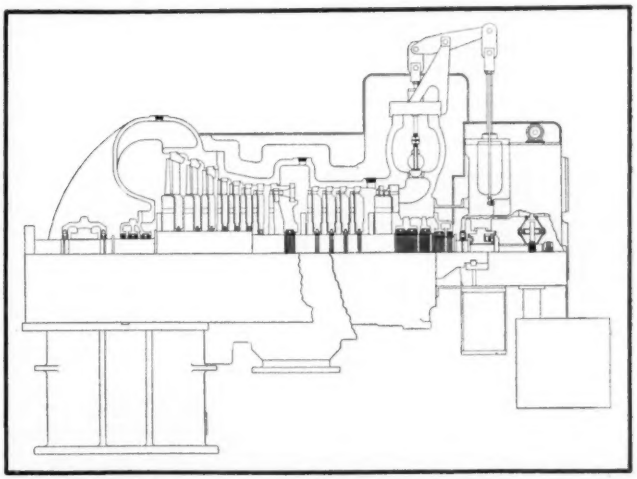


FIG. 10. ECONOMICAL power is provided in a large brewery by this single automatic-extraction type turbine. Heat balance is shown in Fig. 9.

Normal and special turbines compared

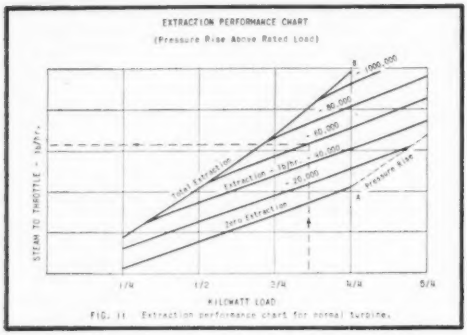


FIG. 11 Extraction performance chart for normal turbine.

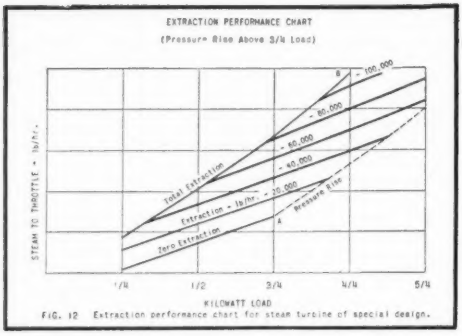


FIG. 12 Extraction performance chart for steam turbine of special design.

of the throttle steam flow at point "B" to the flow at point "A" is less than 4.0.

As a further explanation of the use of the extraction performance chart, if the operator knows the kilowatt load and process steam requirement, he can determine the throttle steam necessary to meet this condition by using the performance chart in the manner shown by the dashed lines.

Now, referring to the chart in Fig. 12, the turbine low pressure element is small so as to give better efficiency under extraction operation when only a small amount of steam is flowing to the exhaust. When extracting no steam and maintaining the extraction pressure, only about 75 percent rated load can be carried. There have been cases where turbines of this design have been purchased, and as a further saving, small condensers have been used under the turbine. With a change in the process, this type of turbine and condenser may no longer be suitable for efficient operation.

A major change in the design and construction after the turbine and condenser have been built and put into operation not only can be very costly but also very impractical. Since there is a possibility of a change in future process requirements, the slight gain in efficiency under specific conditions with a special design machine may not be justified. Consequently, a careful investigation should be made, including an estimate of future requirements, before turbines of special design are purchased.

Higher Temperatures and Pressures

Because of steadily increasing fuel costs, there is considerable interest in the savings in fuel consumption obtainable through use of higher initial pressures and temperatures. In many cases, also, the electrical demand has been rising more rapidly than the process steam demand, leading to a study of steam pressures and temperatures to give the proper balance between kw. load and steam load.

Gain in operating economy and desired power balance can be obtained by increasing steam pressures and temperatures above the 150 to 200 psig. classification.

The chart in Fig. 13 shows the approximate percent improvement in steam rate for various initial steam conditions as compared with a base of 200 psig. 550 F. In each case the exhaust pressure is 10 psig.

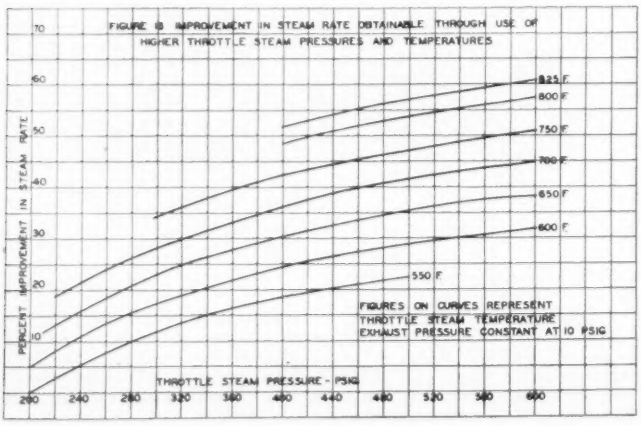
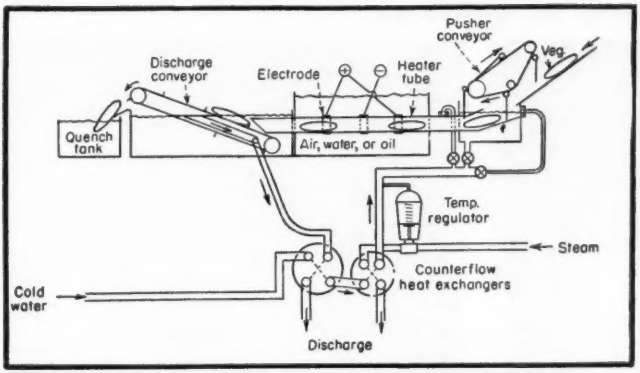


FIGURE 13 IMPROVEMENT IN STEAM RATE OBTAINABLE THROUGH USE OF HIGHER THROTTLE STEAM PRESSURES AND TEMPERATURES
PERCENT IMPROVEMENT IN STEAM RATE
THROTTLE STEAM PRESSURE - PSIG
825 F
800 F
750 F
700 F
650 F
600 F
550 F
FIGURES ON CURVES REPRESENT THROTTLE STEAM TEMPERATURE
EXHAUST PRESSURE CONSTANT AT 10 PSIG

It is quite possible that a study will show that a considerable gain in economy can be obtained through higher pressures and temperatures with only a small increase in initial investment. And in some cases the power-steam balance can be obtained with non-condensing turbines, thus eliminating the use of condensing equipment with its increased cost and concomitant loss in efficiency. The majority of recent installations have been in the 400 to 650 psig. classifications with corresponding temperatures of 600 F. to 750 F. Process pressures vary, depending upon the product, from 10 to 50 psig. in the lower pressure range and 125 to 150 psig. for the higher pressure range.

Manufacturing processes change, high pressure steam is used where low pressure steam formerly was used, electrical loads increase faster than steam loads, and present power facilities become inadequate, resulting in increased production costs. These changes, then, may require a survey to determine how operating costs can be reduced, either through purchased power or with modern extraction type or non-condensing steam turbines. The needs of each plant must be analyzed individually in order to intelligently select the correct steam conditions and type of turbine to obtain the proper economic balance between power and process steam.

It is well to keep in mind, also, that the most desirable equipment for the user is that which will give him the maximum reliability with the minimum of operating expense. The lowest priced equipment is not always the most economical in the long run. So when you purchase equipment, an analysis should be made giving consideration to performance, operation, and maintenance factors.



SCHEMATIC of continuous high-frequency pilot blancher for vegetables.

Continuous Electronic Blanching Proved Feasible In Pilot Plant

Specially built equipment floats product through high-frequency field in glass tube. Molecular stresses quickly generate heat throughout product

QUICK, CONTINUOUS blanching of vegetables with a dielectric heater is technically feasible.

This is now indicated by pilot-plant tests conducted in the Food Technology Department of Oregon State College, Corvallis, by R. K. Reynolds. Economics of the process, however, have not been determined.

Since a high-frequency field generates heat inside the product itself, by molecular stress, there is no heat-transfer delay because of slow heat conduction through the material. Therefore blanching time is only about 20 sec., even for corn on the cob. Blanching this food in live steam takes 10 to 15 min. So the short dielectric blanch means a less severe process and better retention of original flavor characteristics and vitamin values.

Unique blanching equipment was designed and built for the Oregon tests. The blancher consists essentially of a 60- to 70-mm. glass tube through which the product is floated in water. Electrodes around the tube apply high-frequency voltage to generate heat in the product dielectrically. To reduce the heat load, the conveying water is preheated by steam in a tubular heat exchanger, and most of its heat is recovered by a second exchanger. The water is used but once.

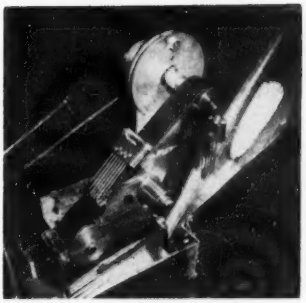
Vegetables are fed into the tube by a tapered metal slide which is kept wet by a water spray. And an endless belt, having hinged metal fingers that engage the product, assists in moving the vegetables from the end of the slide into the blanching tube. The product discharges from the heater tube onto a conveyor, which then dumps it into a quench tank.

Water does not flow straight through the glass tube, but is given a helical motion by variable-angle inlet nozzles. This insures uniform exposure of the vegetables to the high-frequency field and reduces the tendency of the product to stop or move intermittently because of frictional drag.

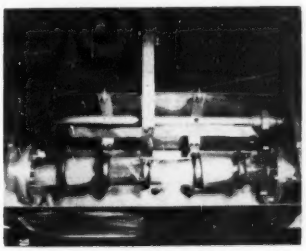
There is a good reason for passing the vegetables through a water-filled heater tube instead of conveying them through an air-filled tube on a belt. In the latter case, steam would arise from the product and provide a path of sufficiently low electrical resistance that arcing would occur in the tube.

The frequency of the generator is between 10 and 13 megacycles, and the maximum rate of heat absorption by the water and vegetables is 6½ kw. For a 40 percent ratio of water by weight, the water absorbs 20 percent of the energy. Generator efficiency is about 45 percent.

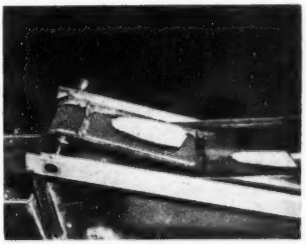
Peas, corn-on-the-cob and diced potatoes were blanched experimentally.



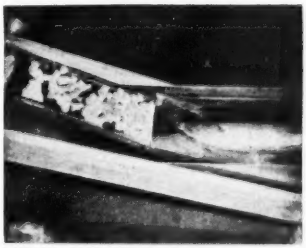
INLET END of blancher, showing slide and belt with hinged metal fingers that move product into heating tube. Here, ears of corn are being blanched.



CORN is seen passing through glass tube where heat is produced by high-frequency field that sets up dielectric stresses in the food. Circular electrodes surround the tube.



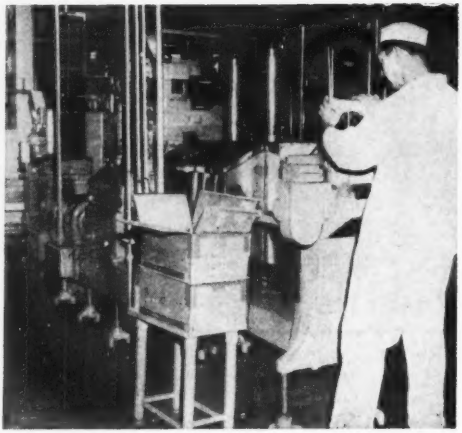
DISCHARGE END of blancher, where the product is picked up by conveyor and discharged into quench tank.



SPECIAL flat-plate adaptor is attached to discharge end of the heater tube when small vegetables are blanched. This plate spreads small pieces uniformly over water-separation conveyor.

Cartons are received flat . . .

1 **SIDEWALLS** to make 1,000 cartons are in this case being sent down conveyor to processing floor below.



2 **BLANKS** are removed from carton and placed in hopper that feeds them to "Sealking" unit (left).

What It Takes to Make a Major

PROCESSING INNOVATION

Sound engineering fundamentals, first off. And second, Teamwork with a capital T—as demonstrated here by the keep-ever-at-it cooperation of Bowman Dairy and Sealright in perfecting their special carton forming and filling machine

LLOYD E. SLATER
Assistant Editor, "Food Engineering"

Many fresh ideas wither in the minds of equipment makers faced with the forbidding costs and trials of commercialization. And many a processor naturally balks at the prospect of being a "guinea pig" for something new.

But this is the story of the bonanza that can come to all concerned—the inventor, the first user, the industry, and, bless him, the consumer—when a forward-looking processor teams with a supplier to perfect a new machine.

Our tale begins over ten years ago, when the Sealright Co., Fulton, N. Y., started work on an innovation in food packaging. The idea was to offer the dairy industry a paper container that could be machine-assembled right in the processing plant.

Three years ago, the first Sealright machine—known as the "Sealking"—was installed in Bowman Dairy Co.'s River Forest (Chicago) plant. And today, after a seasoning period of constant survey and improvement, this unique packaging unit has proved its distinct ability to—

- **Save storage space by using unformed, flat-packed carton materials.**
- **Provide a sterile package by dependable flame treatment.**
- **Eliminate "leakers" by pressure-heat-sealing of plastic-formed seams.**
- **Prevent unsafe filling by a check system of built-in safeguards.**
- **Allow rapid change to another carton size by a simple one-minute operation.**

The virtues heralded above are quite a story in themselves, even in the dynamic packaging field, where machine improvements and fresh twists cascade into industry almost daily. But the real story behind any successful new machine is its critical period of field trial—where cooperation between maker and user is all-important.

Before telling of the constructive teamwork that perfected this unusual machine, let's take a closer look at how it works.

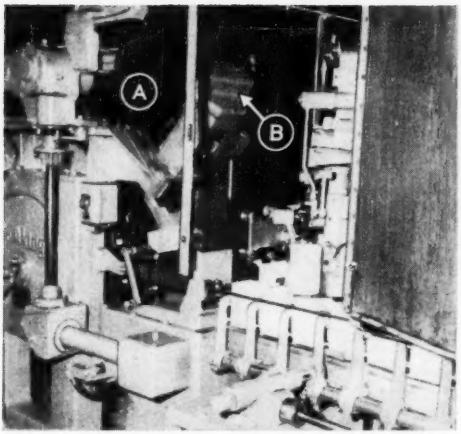
An Integrated Assembly Line

The Sealking unit, in reality, performs a well-knit series of machine operations simultaneously. It is fed four materials (body blanks, bottom blanks, top blanks, and foil) in suitable hoppers, sterilizes these, and forms them into a square, leakproof container. Filling is automatic, prior to topping and sealing, and the package is ejected onto a conveyor for crating.

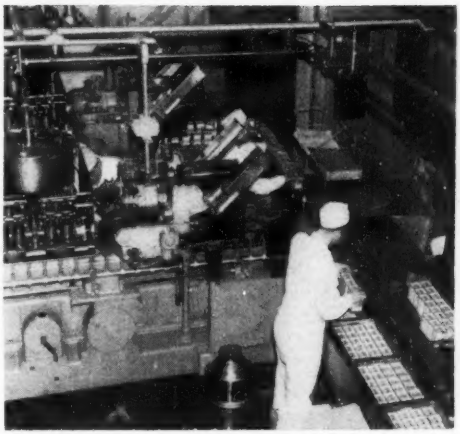
These operations are performed at a speed of up to 70 filled and sealed cartons per minute.

A trip "through" the machine shows its polished integration. Body blanks feed singly from their hopper into a chamber, where they are gas-flame sterilized. Also, the flame treatment softens the thermoplastic coating of the paperboard, so that it will form a side seam.

. . . then formed and filled



3 **CARTONS** are formed here. Blanks, from chute (A), are shaped to sidewalls in forming head (B), then sealed.



4 **ASSEMBLED** and filled cartons are cased. Note 4-valve filler (left), capping operation to its right.

Movement of the body blank at the same time initiates the travel of a bottom blank through its own sterilizing section to the forming point. Here, the carton wall is shaped by a rigid mandrel and seamed under a pressure of 2,500 psi. Simultaneously, the bottom is formed on, and seamed to, the mandrel-supported body by a uniform thrust pressure.

After forming and joining body and bottom, the carton is set upright and travels through a foil-applying section. Here, a small piece of aluminum foil is applied over one corner, extending down into, as well as outside, the container. After filling the top is sealed over this foil, making it a handy opening device and date indicator.

Filling follows, with an ingenious system of four interlocked fillers delivering the quantity called for by container size. For example, when quarts are being run, the carton receives four successive half-pint fills. Pint-sized containers will cause two of the fillers to automatically lock out. Three lock out for half-pints.

The capping operation is a model of machine intricacy. As the carton fills, its top blank passes through a sterilizing flame. The carton is then clamped and held by four jaws. While rigidly held, its top is slid over and forced down into the carton by a square punch. Fingers, located in the punch and clamp, then extend to wipe over and down the sides of the top into sealing position. A leak-proof closure is assured by high pressure and heat.

A machine as unique as this one was on first installation could well require years of revamping and face-lifting before it reached top efficiency. But three years of survey and improvement have seen little in the way of major change in the original machine. Its basic principles were well conceived.

Getting the Bugs Out

Major faults during a field test can either throw out a new machine or be solved in clean-cut fashion by costly redesign. However, it's the minor, heckling little obstacles—the "bugs"—which usually make initial months rough for first models. Sealking and Bowman had their share of these.

Bowman's attitude towards "de-bugging" the unit was both helpful and positive. The new machine was put into operation immediately as a production unit. Sealright engineers were given the run of the plant and were invited to spend their days "living" with the machine. Improvements were figured out during the day's run, built and installed that night, and checked for efficiency in the following day's operation.

It took two years of constant everyday use, accompanied by this sort of spot-engineered improvement, to bring the unit to its present outstanding efficiency. During that time, Sealright had engineers on the premises at all times. These men were rotated at three-month intervals; and they now form the nucleus of a field service force for the machine.

Program for Improvements

The pattern employed for perfecting the Sealking machine could well be set up as a standard for field-proving other

Planning to Pioneer a New Machine or Process?

If so, and your idea lends itself to practical development and operation, then notable rewards may logically be foreseen for your plant and for your industry—*provided the idea is worked out successfully.*

Accordingly, your fundamental question is, "What steps can we take to aim our project for greatest chances of success?"

Here, the accompanying Bowman-Sealright case history will be found of aid. For it not only puts the finger on the many factors involved but also collates them into these pointed before-and-after tips:

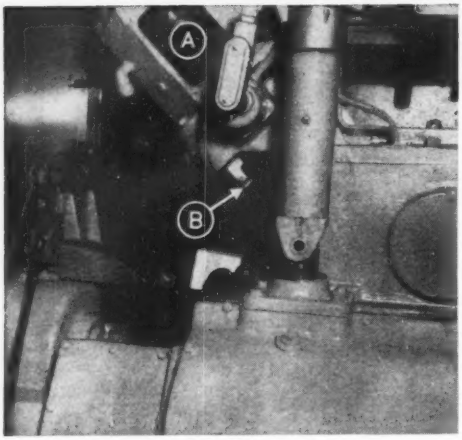
Before Adoption be Certain—

1. **The innovation is basically well designed and engineered.**
2. **The benefits you will derive in your operation are real.**
3. **The equipment maker or supplier is able to bear with the idea until it is perfected.**

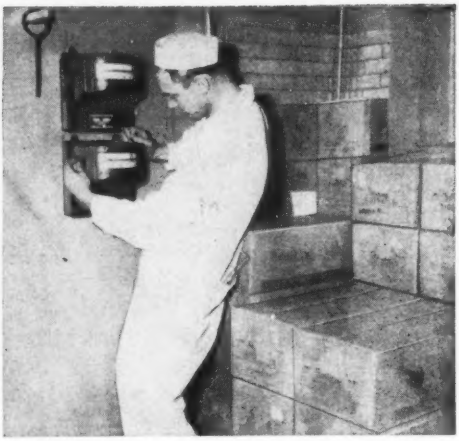
After Adoption be Sure—

1. **Temporary set-backs do not throw out the project.**
2. **The supplier has access to improve things at all times.**
3. **Your personnel are trained by the supplier during the early trial period.**

Sealing temperatures are closely controlled



5 **CRITICAL** temperature is in carton forming head (A). It is checked by thermocouple at (B).



6 **OPERATOR** can easily check temperature in forming head by referring to this indicating pyrometer.

allied equipment. Essentially, it was a program of—

1. Adding devices to keep the machine from breaking its parts due to jamming or overload.

2. Removing the cause for overload conditions (noted in Step 1, (above).

3. Integrating alarms and stop-switches to combat those overloads caused by conditions not removable by Step 2. (above).

4. Incorporating safety features to eliminate any chance of off-standard performance.

In the first few days following installation, it was quickly noted that all major breakdowns were caused by the jamming of cartons as they traveled through the machine. Stress at point of jam could and did result in rupture of even heavy duty parts.

D-Dents and Slip-Clutches

Initial steps then had to be taken to keep the machine from destroying itself before it could be perfected. Bowman's maintenance department cooperated with Sealright engineers to devise d-dents and slip clutches to protect those parts where jamming or overload occurred.

A good example of this protection technic is in the top-forming section of the machine. Two tops feeding over an individual carton would not allow clamping jaws to close. A serious jam would occur with the machine still attempting to push cartons through. Now, any jamming within the top insert is avoided by three d-dents, which save untold breakage in this complicated section of the machine.

Next step was to remove the conditions which caused the overload. Jamming was usually identified by the fact that two paperboard carton parts had stuck together somehow and traveled into the machine. This trouble was traced to the vacuum feeding devices, which sucked the blank from its hopper and sent it on its way. Two pieces would often adhere, and the vacuum would drag the pair as if it were a unit.

The problem was licked by substituting a slicer feed for the sidewall blanks. This device works like a phonograph record selector and can deliver only one piece at a time.

It was difficult to adapt a slicer to the top and bottom hoppers, however. The solution here was to rig-up some way of breaking the adhesion of adjoining blanks. The retaining corners of the chute holding the blanks were built out so that the suction of the feeder would form a contour in the blank as it was pulled from the chute. This curve would break the adhesion to the piece above.

Heat Caused Carton to Stick

Another serious machine jam would occur when a carton stuck to the forming mandrel. It was found that the mandrel was excessively hot at such times. It was simple to eliminate this by locating a thermostatic mixing valve in the hot and cold water lines feeding the mandrel cooling jacket.

But mandrel temperature control did not eliminate all carton sticking. It was found necessary to put a d-dent on the stripping arm to take care of the occasional carton that does not slip off the mandrel. Also, a micro-switch was added to the stripper to automatically stop the machine when such a jam occurred.

Safeguarding the Unit

Despite all measures taken to prevent conditions which led to jamming, this annoyance continued to pop-up at unexpected moments. It was soon noted that the absence of carton blanks could cause just as much trouble as the passage of stuck-together blanks.

For example, the machine would run out of bottom blanks. The sidewalls would continue to feed, however, and a jam would occur just beyond the forming operation. To lick this, a micro-switch was connected which would be de-energized when bottoms were not fed. This would sound an alarm and shut off the side-wall blank slicer feed. Thus, only one sidewall blank would go through without a bottom, and this could be easily picked up by the operator.

Another problem involved product-supply failure. To safeguard here, a probe was put into the filler tank to act as a low-level alarm. When the product supply reached this level in the tank, an alarm sounded and the slicer feeding sidewall blanks automatically stopped. The level was selected, however, so that there would still be enough milk in the filler to finish all the cartons traveling through the machine at the time.

An interesting safeguard aspect was brought out by local public health officials. They were interested in the sterility of cartons being formed by the machine. What would happen to your

aseptic container, they asked, when flames failed in the sterilizing sections? The answer was to put flame detectors on each burner. Any of these devices, upon flame failure, would operate a low-voltage breaker to shut off the machine.

The flame failure protective system was a fine answer to this public health problem, and all Sealking units going into far reaches of the country are equipped with this safeguard in compliance with the rigid standards set up by inspectors.

While most of the "bugs" that slow down or stop continuous operation were being eradicated, another problem arose demanding machine improvement. Cartons were going through the machine and filling smoothly enough, but leakage started to appear in the crate. On inspection, it was found that side-seams were opening.

The trouble was isolated at the carton forming head. It was found that a temperature of at least 425 deg. F. was needed in the bottom of the forming head to get proper seaming action. Falling below this temperature meant "leakers."

A great deal of experimentation was needed to provide a dynamic temperature measurement of this important point. Finally, a specially covered iron-constantan thermocouple wire was actually embedded in the head and allowed to move with it as cartons were formed. A flexible lead connected this 'couple to a wall-mounted indicating pyrometer.

Now, should the forming head temperature fall below its critical value, the operator is warned by a signal light. To maintain the proper value, he merely adjusts a voltage regulator supplying the Calrod heating units imbedded in the head. Further experimentation is still under way to improve this arrangement, with complete instrument control the objective.

Sanitizing Schedule Setup

While living with the new machine in its early days, Bowman soon developed a top-notch sanitizing procedure —of a caliber equal to that of the other clean-up operations in company plants.

The Sealking units are cleaned and sterilized in the morning before use and cleaned again at night after shutdown. Total cleaning schedule amounts to about 2 man-hours per machine daily.

When parts are thoroughly clean, they are sterilized with steam, chlorine-dipped, and remounted on the unit. Then the whole unit, including undemountable and inaccessable parts, is washed with a wall-mounted portable chlorinator spray.

In the evening the machine is once again completely scrubbed, washed, and dismantled. Its parts are put on a rack for morning chlorination and assembly.

More About the Carton

While the forming and filling unit is a masterpiece of machine design, the container it forms is also—according to users—a prizewinner.

Sealright operates an unusual sanitary design paper mill to supply the die-cut, printed, and coated carton blanks. Top and bottom blanks are the same for all carton sizes—2¾ in. square. The sidewalls come in four sizes: 8 in. for quarts; 4¼ in. for pints; 3 in. for ⅓ quarts; and 2½ in. for half-pints. A simple change of a pair of stops and travel rails converts the machine from one container size to another. Bowman does this in less than a minute.

Another unusual feature of the carton is its coating. Wax could not be used, since the basic idea was to ship container parts flat. Sealright then came up with a non-toxic, odorless, and tasteless vinyl coating for the carton blanks. And this plastic had the ability to form self-sealing single-fold seams under heat and pressure.

Sanitary aspects of the carton are excellent. The pouring lip is protected before filling by a sterile aluminum foil tab. To pour, this foil is lifted, hinging the top at that corner. The top countersink offers a dam against any contamination during pouring. Also, since a portion of the top seam must be torn when opening, the container is tamper-proof.

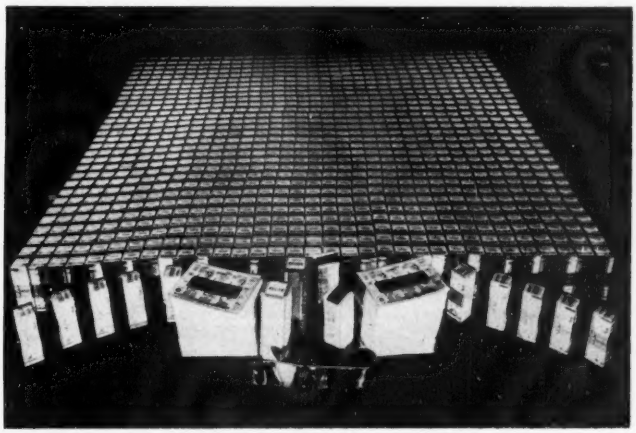
But most notable is the carton's benefits to the dairyman. Its sturdiness, flexibility of use, and inventory simplicity are all pre-consumer assets.

Outstanding is its space-saving virtue. Take the daily capacity of one Sealking machine—30,000. A three-month carton blank supply for this machine (2,700,000 quarts) could be stored in a space approximately 18 x 30 x 8 ft.

The "plus" features of this carton and the well-established perfection of its forming and filling machine are finally starting to pay off for Sealright. Today, 26 machines are serving the dairy industry throughout the country. And the chances look good for other applications in the food field.

Blanks . . . finished containers

7 **THESE** three flat blanks, plus a small foil tab make up carton.



8 **SPACE SAVING** is clearly evidenced here. These 1,000 cartons were assembled from the small quantity of blanks and foil (foreground).

THIS MODERN Walter H. Johnson candy plant was carefully laid out for straight-line production. Emphasis in construc-

Candy Maker's 9-Step Revamp Shows How to—

Boost Your Plant Efficiency

It boils down to these fundamentals: Simplifying handling all along your line, going to automatic and continuous, adopting special instrument controls, bettering sanitation, and improving your power system

C. L. SMESSAERT
Executive Vice-President,
Walter H. Johnson Co., Chicago

Through the adoption of straight-line production methods, improved materials-handling technics, and continuous process units, we have attained more efficient production of uniform quality candies at our new Walter H. Johnson plant in Chicago.

Improvements Outlined

There have been nine outstanding advances in efficiency:

1. Handling of raw materials—sugar, corn syrup, and condensed milk—has been mechanized.

2. Shelled peanuts are now automatically cleaned, roasted, cooled, and blanched.

3. Chocolate for coating candy bars in enrobers is continuously melted and tempered.

4. A separate scaling room has improved the set up for weighing small quantities of ingredients used for candy batches cooked in jacketed kettles.

5. Large batches of sugar, corn syrup, and fat are preheated on the mezzanine, and the mixture is then directly metered down into cooking kettles on the first floor.

6. A high-pressure condensate-return system was installed to increase output of cooking kettles, improve quality, and save fuel through higher boiler efficiency.

7. Steam pipes were laid out in readily accessible areas so as to facilitate maintenance.

8. Cooking of each batch of candy is precisely controlled with the aid of a temperature indicator connected to a series of thermocouples. And, by manipulating a multiple selector switch, attendants can now quickly read the temperature of each batch of candy.

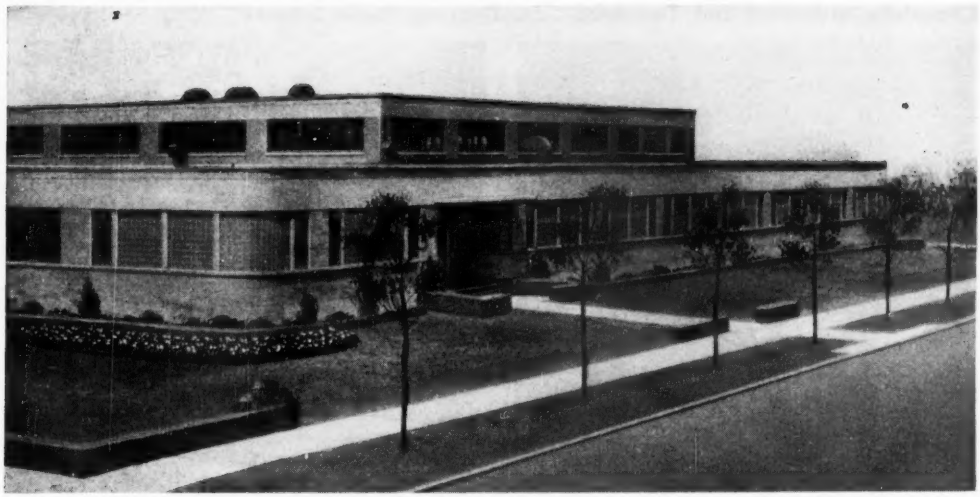
9. The job of emptying kettles and spreading the candy upon cooling tables has been speeded up and made easier.

Built for daylight production, this modern, sanitary candy plant consists of one story, with mezzanine and basement sections. On the main floor are conducted such major unit operations as cooking, cooling, cutting candies to size, tempering melted chocolate, coating the confections with chocolate, and packaging.

On the mezzanine, sugar is stored, ingredients used in small amounts are scaled, peanuts are roasted, chocolate is melted, and bulk ingredients are preheated.

The small basement area is used for storing corn syrup, recovering condensate for feeding back to the boiler, filtering and conditioning the air, and filtering the water.

This plant was designed to permit most efficient production layout. Space along two sides of the building was set aside for future expansion. Heat and ventilation are provided by an inside system of forced draft and mechanical exhaust, since all windows



tion of plant was also on sanitation. Special closed ventilation system minimizes chances of contamination of confections.

are sealed tight. This closed ventilation system reduces to a minimum any contamination of product from the atmosphere. Air coming into the plant is filtered and air-conditioned.

In the construction of the plant, emphasis was upon sanitation and cleanliness. Partitions and walls are made of nonabsorbent, washable tile, and there are no painted walls. The concrete floors are well-drained.

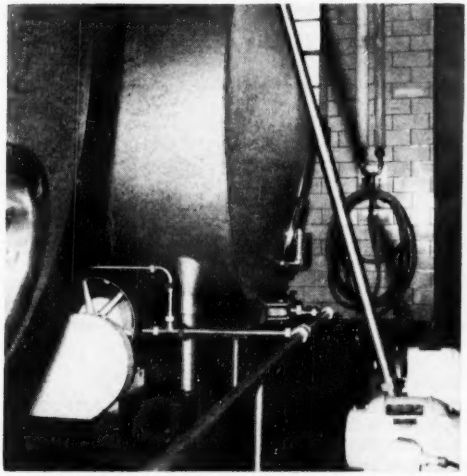
1—Handling Savings

First significant change in the Johnson operation was improved handling of raw materials received in bulk.

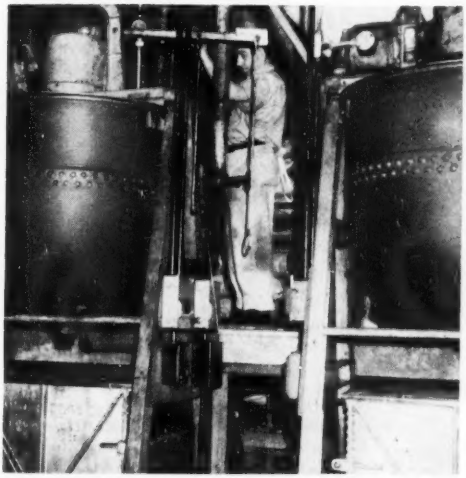
The installation of a condensed-milk handling and storing system has eliminated many hours of back-breaking labor. Formerly, unloading of a freight car required two men for the job of rolling 550-lb. barrels of condensed milk into the plant, lifting each barrel to dump the milk into holding tanks, and hauling the empties into the warehouse. Still another man had to measure milk into a receptacle and dump it into each cooking kettle.

Aside from the manual handling needed to move condensed milk by this former method, there were other disadvantages. A considerable amount of milk—approximately 3 percent—remained in each barrel after it was emptied. Wooden barrels are unsanitary, for as they are rolled into a plant, there is a chance of picking up dirt. And, unless care is exercised, there may be contamination of the milk while it is being dumped into the holding vats. Empty barrels also had to be sold.

Processing Is Sped by Milk Pumping, Premelting of Sugar

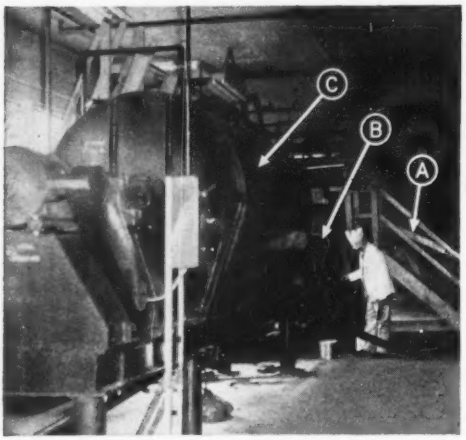


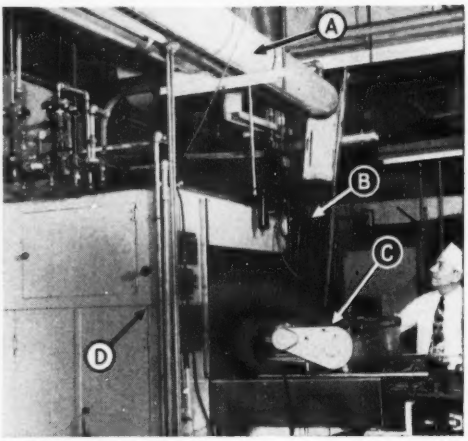
CONDENSED MILK is pumped from tank truck into these storage tanks, from which it is then metered into kettles.



COOKING TIME is shortened by preheating large batches of sugar, syrup, and fat in these 300-gal. kettles.

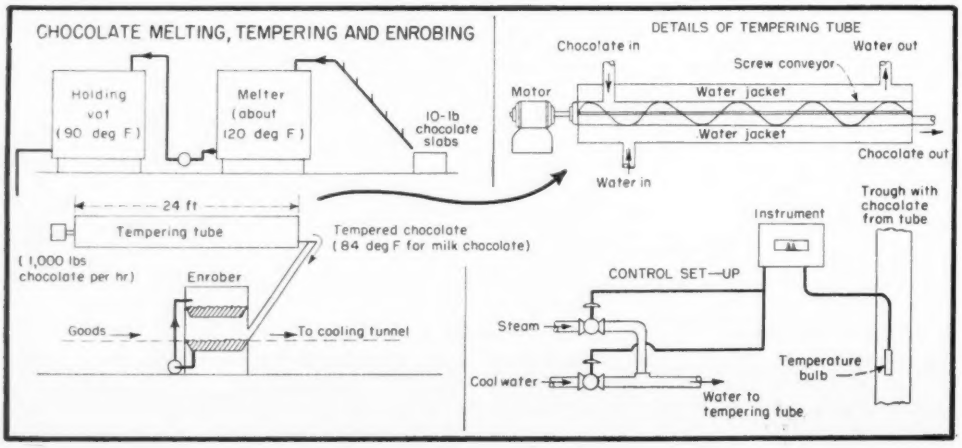
Chocolate Is Melted and Tempered . . . Drawing Shows Scheme





CONVEYOR (A) feeds slabs of chocolate into melter (B). Then melted chocolate is pumped into 13,500-lb. capacity holding vat (C), later to be gravity-fed to tempering tube.

FROM continuous tempering column (A), checked here by Plant Superintendent J. Peota, chocolate is chuted (B) past control thermocouple (C) into enrobing machine (D).



Now, the job of unloading condensed milk is done by one man in but a fraction of the time. When a tank truck of condensed milk arrives at the plant, a hose is hooked up to the truck and a sanitary pump. From then on, unloading and filling the two 3,000-gal. stainless steel-lined storage tanks is automatic.

The new milk-handling system has another advantage: Milk no longer is transferred via measuring receptacles that must later be cleaned. Now the condensed milk is metered directly into the cooking kettles.

Two precautionary measures have been taken to keep down the bacterial count in the condensed milk. First, ultraviolet lamps have been placed inside each cork-insulated tank, above the condensed-milk level. Second, the temperature of the milk is maintained at 45 deg. F. by means of refrigerated coils in the jacket of each tank.

Twin agitators in each tank also keep the milk solids from settling. All pipes, valves, and couplings are made of stainless steel.

Handling corn syrup is also completely mechanized. The syrup is delivered to the plant in tank cars that are equipped with steam coils for heating the syrup as it is pumped into four rectangular, insulated metal storage tanks in the basement of the plant. Total capacity of the storage tanks is enough to hold six tank cars of corn syrup. Steam coils on these storage units keep the syrup at 90 deg F. to facilitate pumping to the production department. As in the case of condensed milk, these tanks are equipped with ultraviolet lamps, and the corn syrup is also metered directly into cooking kettles.

Sugar is shipped to the plant in 100-lb. multiwall paper bags that are stacked on pallets. From the unloading dock, pallet loads of bagged sugar are transported by an electric forklift truck to the mezzanine, adjacent to the preheating kettles.

2—Automatic Peanut Roasting

Continuous cleaning, roasting, and blanching of peanuts has enabled a step-up in production. Former transporting of bags of shelled peanuts from freight car to roasting department, loading and unloading the vari-

ous nut-processing units, and hauling the peanuts to the cooking department were laborious, time-consuming tasks—all done manually.

Now, bags of peanuts are stored three pallet loads high near the unloading dock. From here, the shelled peanuts are dumped from the bags into a metal hopper and then bucket-conveyed to another metal hopper in the mezzanine-roasting department, where they are cleaned, roasted, and blanched.

In removing foreign matter from the shelled peanuts, the units are first screened, then aspirated. Cleaned nuts are next bucket-conveyed to a batch hopper that feeds them into a Radiant Ray gas-fired roaster. At this point, each 330-lb. batch of peanuts is automatically roasted to a uniform color in about 15 min. Constant temperatures, maintained with the aid of control instruments, assure uniformity in the color of the peanuts as they revolve in the roaster drum.

Roasted nuts then drop into a metal cooling tray with a perforated bottom. This tray is hooked up to an evacuator that speeds cooling of the nuts. After the nuts are sufficiently cooled, the tray is tilted and one side is opened to dump the peanuts into a hopper.

Another bucket elevator delivers the nuts into a storage bin that feeds a blancher, where skins are removed from the peanuts by rubber rolls, rotating in opposite directions. Loose skins are removed by a cyclone unit, while the nuts continue onto an inspection belt, where girls remove any remaining foreign matter and unblanched nuts. As a further precaution, magnets at the end of the inspection line pick up any metal particles. Finally, skinless peanuts are conveyed to twin storage bins, adjacent to the first-floor cooking department.

Now, by merely opening a slide-valve on a discharge pipe, operators in the candy-cooking department collect peanuts in a stainless steel pail and then add them to the candy on the cooling slabs.

3—Continuous Melting and Tempering

Increased efficiency was attained with the installation of a continuous method of melting and tempering chocolate prior to feeding it to the enrobers. Here's how the new system works:

Chocolate is received in bales containing 20 10-lb. cakes. Fork-lift trucks transport the bales to the melting department on the mezzanine.

With the present system, one man loads slabs of chocolate onto an inclined rubber conveyor belt that feeds them into a 13 500-lb.-capacity, steam-jacketed melting tank, equipped with horizontal, rotary paddles. Temperature in the tank is automatically controlled at approximately 120 deg. F. to produce uniformly melted batches.

From the melter, the chocolate is pumped to two similar units serving as holding tanks. These tanks are also steam-jacketed and equipped with rotary mixing paddles and with automatic temperature controllers that keep the chocolate at 90 deg F. All three tanks are completely enclosed to prevent contamination of the chocolate.

The former method required manual loading of the slabs into a battery of batch melters, which held anywhere from 400 to 2,000 lb. of chocolate. While these melting kettles were steam-jacketed, they were not equipped with automatic temperature controllers. And these kettles were not completely enclosed like the present continuous system.

Probably one of the most outstanding installations at the plant is the two continuous Blommer chocolate-tempering columns or heat-exchangers, each handling 1,000 lb. of tempered chocolate per hour. These 24 ft. long and 1½ ft. dia. water-jacketed tubes replaced four 500-lb.-capacity kettles that took about 2 hr. to temper chocolate.

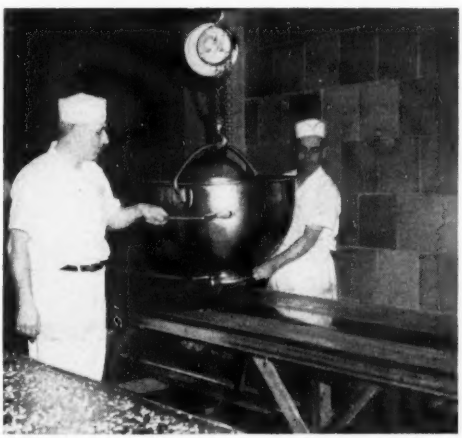
Melted chocolate is gravity fed through electrically heated pipes to one end of the tube, screw conveyed through the unit, and then discharged onto a trough that feeds the enrobing machine.

A thermometer bulb, is contacted by the tempered chocolate as it is chuted from the tempering tube into the enrober. This bulb is connected to a temperature controller that regulates two diaphragm valves. One valve is in the line which discharges steam into the water-supply line serving the water jacket of the tempering tube. The second control valve is in the water line ahead of its junction with the steam line. These two valves simultaneously control the flow of steam and cold water to maintain the correct chocolate-tempering temperature.

This continuous tempering of chocolate does away with the former agitator-equipped batch kettles. Eliminated, too, is the need for a man to regulate and control the tempering operation. The screw conveyor in the tube-shaped unit mixes the melted chocolate so that it is completely tempered as it travels through the column.

Chain-Hoist Monorail Eases Handling

LEAVING cooking kettle (top), candy is emptied into bowl (bottom), which is then raised by chain hoist.



PUSHED along monorail, candy goes to tables, onto which it is poured for cooling before cutting.

4—Separate Scaling Room

Efficiency has been attained in still another manner: A separate room has been set aside on the mezzanine for scaling small amounts of such ingredients as salt, flavors, cocoa powder, and nuts.

This system has greatly speeded operations in the first-floor cooking department. Now that these ingredients are already weighed and transported on racks to the cooking area, attendants at the kettles no longer have to weigh them, and thus slow down their cooking operation. Moreover, the cooking-kettle area is not cluttered up with scales and containers of these miscellaneous type ingredients.

5—Bulk Heating Aids Cooking

Preheating of large batches of sugar, fat and corn syrup, to shorten cooking time in the first-floor processing area, is still another significant advance—the fifth change. On the second floor, syrup, fat, and water are metered, and granulated sugar is dumped from bags into 300-gal. kettles. City water is pressure-filtered and treated to remove any suspended solids as well as available chlorine.

Each batch is given a short cook—just enough to get the sugar into solution—and agitated at the same time. After the bulk ingredients are preheated, the attendant pulls a lever that opens a quick-discharge valve at the bottom of the kettle. Preheated syrup and fat then pass through a small wire-mesh screen mounted in the cover of a stainless steel collecting trough directly below each kettle. From this holding trough, preheated syrup is metered into small steam-jacketed kettles in the first-floor cooking department.

In addition to cutting down labor costs, preheating of bulk ingredients in a separate area makes the task of adding them to the cooking kettles easier and safer for the workers, and sanitation is improved. Particularly, product uniformity is materially enhanced.

6—Higher Boiler Efficiency

Installation of a Planert high-pressure condensate-return system designed—to stop pouring Btu's into the drains—was a real money saver. This condensate-recovery system eliminates the cleaning and maintenance of 36 steam traps formerly at the bottom of the cooking kettles. During cooking, steam in the jacket of the kettles condenses, and instead of going to the traps (where water was formerly separated from the steam and then discharged into the drain), 210-deg.-F. condensate is now reclaimed. High temperature condensate is picked up by a high-pressure pump and delivered to the boiler, where it is then converted into steam.

Since this efficient steam-utilization system was adopted, five benefits have been obtained: (1) A definite savings in boiler fuel, (2) reduction in cooking time, (3) improved products, (4) more even boiler operation with better control of the water level, and (5) higher steaming capacity of boilers because of higher feedwater temperature.

The condensate-recovery system works this way: Condensate discharged from the cooking kettles is gravity-fed to a steam pump in the basement, then it is pumped from the return line to the boiler-feed water tank. The pump is a centrifugal unit, driven by a 3-hp. motor running at 1,800 rpm. Condensate from 36 cooking kettles of 100-lb. capacity each is handled by one condensate-return system, with a second one on standby service. An indicating thermometer shows the temperature in the return line, and gages reveal pressure in the return and pump-discharge lines. Pressure in the return line must be higher than that in the boiler.

7—Pipes Accessible for Quick Repairs

Arranging pipes for delivery of steam to the kettles in the tunnel below the cooking-station floor simplified and speeded maintenance work. Pipes are now readily accessible for repairs by the maintenance crew.

There is another advantage in positioning these pipes below the kettles: In this way, they do not clutter up the area above the kettles.

8—Faster Cooking-Temperature Readings

Close control of the temperature in each cooking kettle is another notable improvement. Each temperature indicator is connected directly to four thermocouples inserted in the kettles. And each 'couple is connected to an indicator having a selector switch. By manipulating the multiple-selector switch, temperature of the candy in any of four kettles can be read on one instrument. Thus, a number of needless steps are eliminated and the attendant is able to carry out this work more efficiently.

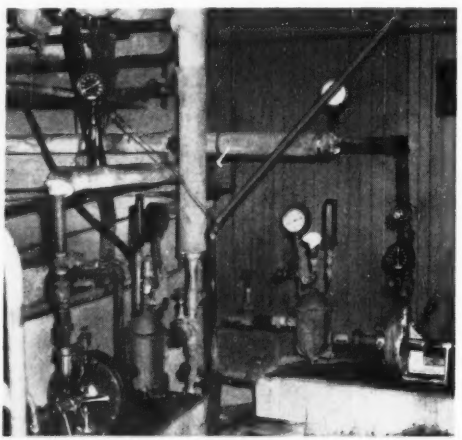
9—Kettle-to-Cooling Table

In the last change, considerable sav-

(*Turn to page* 145)

No Btu.'s "Down the Drain"

OUTPUT of this battery of kettles has been increased and fuel saved by returning condensate to boiler.



CONTINUOUS condensate-return system has 10,000-lb. per hr. capacity. Second unit (left) is on standby service.

BY CAREFULLY CHECKING incoming materials, you guard both your product and plant from infestation. Here, candy technicians examine peanuts for evidence of foreign matter. (Photo courtesy Loft Candy Corp.)

Proper Raw-Material Inspections

They're Primary In Building a Practical Sanitation Program

To produce clean foods, processors must use ingredients free from insects and microorganisms. And this calls for a foolproof system of checking, analyzing, and recording shipments—and rejecting those that are tainted

J. CARL DAWSON

J. Carl Dawson & Associates,
Preventive Sanitation Consultants, St. Louis, Mo.

An efficient procedure assuring protection against purchase and acceptance of contaminated raw materials is No. 1 on your sanitation program.

In this way, both your products and your plant are safeguarded. For unsanitary materials—those tainted by insects, microorganisms, and the like—are thus banned before they can become ingredients of your processed commodity. And by the same token, such contaminants are thus curbed before they can spread in your plant and cause a condition of bad sanitation.

Freedom from contamination must, of course, be given special consideration beyond the usual check for quality. It takes special knowledge to determine contamination, just as it does to evaluate quality.

If the manager of a food processing plant will ask himself the following eight questions, and carefully evaluate

For Keeping Tab On Bad-Order Lots

INSPECTION AND RECEIVING REPORT

Received the following, brought from

Car No., if any

Delivered by

Name of Article

No. of Packages

Kind of Package

Include in above, full number offered for delivery, showing rejections below)

NUMBER OF PACKAGES IN BAD ORDER AND REASON:

Broken Open

Water Damaged

Contaminated by other materials

Infested by rodents or insects

Other (Explain - Other - on reverse hereof)

DISPOSITION OF BAD ORDER ITEMS:

Set aside and held

Refused and returned to carrier

Other (Explain - Other - on reverse side hereof)

REMARKS:

Date

19

SIGNED

his answers, he should be able to determine if he is carrying on his purchasing and receiving of raw materials in a manner assuring adequate protection. His answers should also help in ascertaining if the obligations to the consumer and various federal, state, and city sanitation officials are being fulfilled.

1. Do you, as a processor, hold yourself responsible for contamination of raw materials you have purchased, or do you mistakenly pin the blame on your supplier?

2. Do you recognize the possibility of contamination of raw materials during the course of purchasing them, and take steps accordingly?

3. Is your organization fully aware of the most likely contaminants of your raw material, and does it know how to recognize them by microscopic and macroscopic method of examination?

4. Has your management set up a specific policy on the acceptance or rejection of contaminated raw materials?

5. Do you specify packages affording maximum resistance to contamination of materials during transit and storage?

6. Does your receiving department inspect and sample raw materials for contamination, and does it maintain general sanitary conditions and keep a record of inspections and cleanings?

7. Are you carrying out your processing operations with due attention to the fact that there is rarely an acceptable method of cleaning or reconditioning contaminated raw materials?

8. Is your system of purchasing and receiving, and the records relating thereto, such that if your operation is questioned by a governmental agency, you can readily show that negligence has not been involved?

An additional prime factor to be considered is the question of providing sufficient storage facilities—to avoid any situation where rejection of a delivery of raw materials might mean shutting down your plant.

Processor's Responsibility

The food processor who obtains his raw materials directly from farmers is more likely to recognize his responsibility for freedom from contamination than one buying from another food processor or packer.

Still encountered is the processor who labors under the misconception that his supplier is responsible for the sanitary condition of his raw materials. He feels that if there are customer complaints, or if he is called upon to explain the occurrence of contaminated raw materials before some governmental agency, all he needs to do is 'pass the buck' to the supplier, and everything will be smoothed over and forgotten. He also feels that his obligation is fulfilled simply by the policy of buying from the most reliable sources of supply.

But with this attitude, he is likely to be rudely awakened. For he will learn, the hard way, that the processor —not the supplier—is responsible for the sanitary condition of the raw materials he uses.

It is, of course, pertinent that raw materials be obtained from a reliable source. However, it must be remembered that no firm can be expected to perform its operation with 100 percent perfection. The organization of any source of supply is made up of ordinary people, subject to human errors. It must also be remembered that a sanitary product may be manufactured by a reliable supplier, and be free from contamination, but that the product is subject to contamination during intervening storage and shipment to your plant. In short, complete faith and dependence on the source is not logical.

Recognizing Contamination

Since you, as the processor, are responsible for your raw materials, awareness of this fact, and action accordingly, is necessary during purchasing. Every supplier should be advised in advance of delivery that his materials are to be checked for their sanitary condition, and that if they are unsatisfactory from the standpoint of contamination, they will be rejected. The supplier should also be informed that repeated offense will result in loss of business.

Satisfactory handling of the matter of sanitation in connection with purchasing requires a background of knowledge and a great deal of diplomacy. It is well known to those familiar with sanitation problems, that specific contamination of food is a matter of degree of, rather than complete absence of, taint.

You may, then, assume that all of your raw materials contain some contamination, and that your standard will have to be set upon a reasonable degree of freedom from it. Therefore, it would be wise to refrain from any contacts with your suppliers on the subject until you have inspected and analyzed samples from the raw materials which you are regularly using, and then have contacted sources of information that will help you determine a reasonable standard.

To do this, your management, sanitarian, purchasing agent, laboratory personnel, and the receiving department employees must be thoroughly trained in this matter. The sanitarian must list all raw materials and determine the most likely contaminants and their most probable sources. The receiving department must learn how to take a composite sample and how to make visual inspections for contamination—by naked eye or under a low-power microscope. Technicians in your laboratory should know how to make extraneous-matter counts. If you do not have a laboratory, you should call upon a reliable commercial laboratory to do your analyses.

If your company has had no previous experience in inspection and analysis of food products for contamination, there are two possibilities open: You can have your personnel

take outside courses in sanitation and/or laboratory methods in detection, or you can call in a professional sanitarian to directly familiarize the personnel with your problems.

Accepting or Rejecting

You have now acquired a background of training and experience that will permit you to determine a general policy concerning what may be considered acceptable or unacceptable raw material. You should now call management, your sanitarian, and purchasing, receiving, and laboratory personnel into a conference to discuss and to familiarize each other with the various angles of the problem. You are likely to find it difficult to set forth a clear-cut policy on accepting or rejecting raw materials, because of the many angles. You will probably find it expedient to come as close as practical to such a policy, and then schedule further conferences looking toward more precise definitions for your approach. Sometimes individual decisions concerning single lots of materials received will be necessary.

Proper Packaging

In the course of setting up a sanitation procedure on the purchasing and receiving of raw materials, you will have observed that there is a relationship between packaging and contamination. You will find that some packages permit easy entrance of insects during storage and shipment. You will also note that some packages will permit contamination of the product from rodent excrement outside of the package. You will further note that some packages are superior to others in protecting the contents from dirt and moisture.

If your supplier has produced a sanitary raw material and packed it in a package which permits contamination during storage or shipment to your plant, then it is unsatisfactory for your use. A study of packages commonly in use frequently will reveal that a satisfactory container may be had at little or no increase in cost over an unsatisfactory package.

Therefore, it becomes necessary that you be familiar with the various packages available and that your purchasing department specify use of those packages that are best suited for prevention of contamination and at the same time are in line with cost factors.

Inspect Goods on Arrival

Recently, the writer participated in a Food & Drug Administration citation hearing, where the officer stated

(*Turn to page* 168)

COMING from dicer, 1-in. squares of the salmon fillets drop into "pumpkin filler," then are scraped forward into cans on conveyor below.

Pack Diced Salmon in 4-Lb. Cans

Boned, skinless fillets are cut, then go via special "pumpkin filler" into containers

RAY BLOOMBERG,
Food Engineering Correspondent, Seattle, Wash.

Canning salmon in 4-lb. cans is one of the latest packing jobs to be converted from almost entirely manual to semi-automatic operation.

At the Bellingham, Wash., plant of Pacific American Fisheries, a new line has been set up that takes salmon fillets from a skinning-boning machine and packs them into 4-lb. cans, instead of into the conventional 1-lb. can.*

On the 4-lb. line, the skinless-boneless fillets first go by belt conveyor into a dicer that cuts them into 1-in. squares. Another conveyor deposits the diced salmon in the "pumpkin filler," where cans are filled 10 at a time, 30 cans a minute.

This filler is a large rectangular stainless-steel tub with appropriate-sized holes through which the diced salmon is manually filled into the cans positioned below it on a conveyor. An ounce of salt is added to each can.

After the cans are filled, the filler is tilted back to free them, and they then move by conveyor to the weighing station. As the last can clears the filler, one of the attendants places a rod between the final filled can and the first empty one. Since this rod is positioned between uprights on the conveyor line, the empty cans are held in place beneath the filler, which then is lowered upon them.

After being weighed manually, the cans are sealed, spray-washed, and loaded on retort trays, six high. They are then moved by fork-lift truck to the retort, where they remain for 5 hr. 40 min., of which 3 hr. 25 min. is cooking time at 242 deg. F. under 15-lb. pressure, with 30 min. needed to attain the cooking temperature and 30 min. allowed for cooling.

Since cooling a 4-lb. can is much more difficult than cooling a 1-lb. can, cold water is introduced into the retort through a 3-in. pipe after cooking has been completed. This water enters at the bottom of the retort and drains off near the top, with 9,000 gal. in the retort at a time. There is a constant flow of cold water, under pressure, during the entire cooling period.

The canned salmon, now cooled to 100 deg. F., is allowed to stand overnight before being hand-labeled. The light-meat Keta salmon are labeled Sam-o-lets, while the reds are labeled Sirloin brand—the same brand names as used for the skinless, boneless salmon that P. A. F. packs in the smaller-size cans.

* P.A.F.'s overall operation was described in a special article and diagrammed in a foldout flowsheet on p. 44-46 and 100-103, respectively, of Apr. '50 FI.

SAFE NEW WAY to clean brew kettles is a special Blatz development. Instead of entering kettle, as in the old way, worker now reaches inside with long detergent sprayer. He stands on nonskid platform and is protected against caustic cleaner by heavy rubber apron, long gloves and plastic eye shield.

How To Set a Safety Record

Blatz did it—with a $50,000 saving—by bringing everyone into the act . . . Safe kettle cleaner and other aids developed in brewery's well-planned program

GREGG R. MEYERS

Director of Safety, Plant & Fire Protection
Blatz Brewing Co., Milwaukee

In less than two years, safety engineering at Blatz has dropped the accident frequency rate more than 80 percent—from 46.3 to 6.9. And company employees recently racked up a new brewing industry record: They had worked more than 1,000,000 manhours without a lost-time accident, as of the first week in December, 1950.

This record, coupled with a frequency rate 75 percent below the national average for the industry, brought the workers a special award from the Liberty Mutual Insurance Companies.

While actual figures are not immediately available, William J. Janssen, vice-president and treasurer of Blatz, said he would estimate the dollar savings somewhere in the neighborhood of $50,000.

"But that is not half the tale", said Janssen. "What is more important is the immeasurable human suffering which has been totally avoided because people worked safely".

How Hazards Were Removed

Among specific safety problems in the brewing industry, many of which are found in other food processing plants, are these: Damp floors, a large amount of glass used for packaging, heavy loads to be lifted, strong solutions used in cleaning, and a great number of motor vehicles on the streets and highways.

It is doubtful whether breweries and other food plants ever will eliminate damp floors. The necessary cleanliness means constant scrubbing of floor and wall tile. And stockhouses, because they are refrigerated, always have wet floors as a result of condensation and the fact that temperature and humidity are not conducive to drying. Packaging machines and conveyors are lubricated by a liquid solution dripping constantly onto chain belts, and from there to the floor.

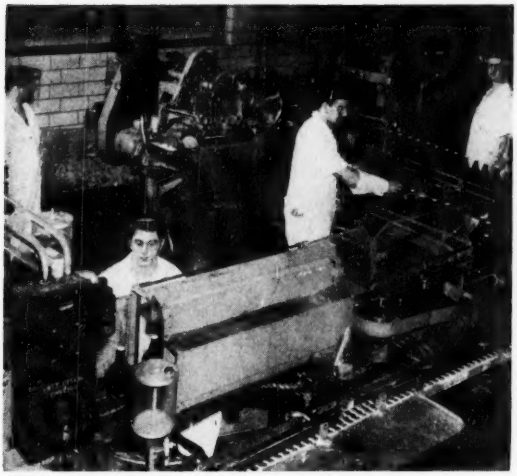
Elimination was the first step, to the extent that it was feasible. Where it wasn't, the approach was the development of safety walks and treads, selection of nonskid paints for floors, ladders, platforms, stairs and hallways, and provision for safety shoes for both ladders and men.

In the handling of glass, it was possible to reduce the occasions of nicks and cuts by adding new machine guards in some places. Further help was use of corded sleeves, face shields, safety glasses and heavy gloves by those employees who were brought into contact with the problem.

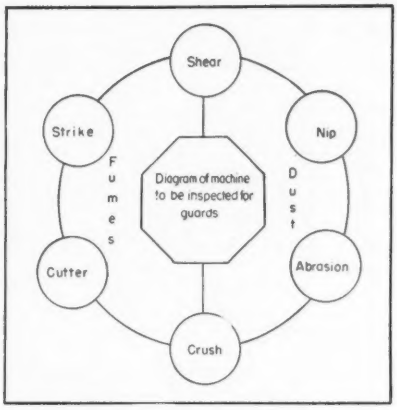
Strains always are a factor. Helpful here are proper demonstration of correct lifting methods, plus the addition of pallets and fork trucks in some cases and hand trucks in others.

As in the case of all food products, the necessity for keeping brewing equipment clean is top-shelf. But in the brewing field, the problem concerns not only small items used in processing, but huge cooking and brewing vessels holding upwards of 700 bbl.

Down through the years it had been



WELL-PROTECTED workers. Expanded metal guards fence in moving parts of machines. Face shields, safety glasses and corded sleeves guard men against glass in event of bottle breakage.



DANGER DIAGRAM used at Blatz to spot machine hazards. Fumes and dust are first considerations. Then safety engineer determines whether machine crushes, cuts, strikes, shears, nips or involves abrasion. If so, metal guards probably are needed to assure protection of personnel.

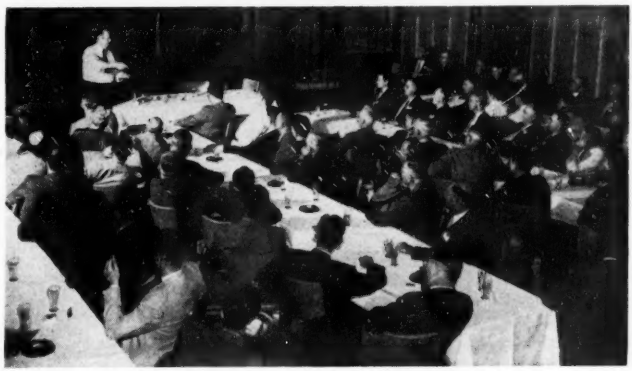
the custom for workers to crawl into most of these vessels and clean them with strong solutions and long-handled brushes, but with little protective clothing. At Blatz the practice has been changed. In the first place, any man handling that type of solution is equipped with a plastic face shield, an acid-resisting rubber uniform, and heavy rubber gloves. Warning signs are placed at all approaches to the working area, and all-purpose gas masks are located conveniently around the plant areas.

Three departments worked together —safety, engineering and brewing—to design and build a special cleaning machine for some of the larger vessels. No longer is it necessary for the worker to crawl inside a brew kettle and do his cleaning chores with a long-handled brush. The new unit consists of a supply tank for the solution and a rotary pump to force the cleansing agent from the tank through hose attached to a spray-type nozzle at the end of a 12-ft. handle. Using this device, the brewery worker can remain outside of the 720-bbl. brew kettles and still do a thorough job of cleaning after every brew.

The importance of this phase strikes home when one considers this fact: In its brewhouse alone, the company has three stainless steel kettles, which must be cleaned, inside and out, six to eight times a day as brewing moves around the clock.

Danger Spots Isolated

No chances are taken with hazardous equipment on moving parts. Metal guards and locked enclosures isolate danger spots.



SAFETY is everyone's job at Blatz. So instruction is given, in special monthly meetings, to supervisors and department heads, who in turn train company's workers. Outside speakers frequently address the meetings.

SENIOR safety committee meets monthly to decide upon new safety equipment, advise safety director, and make regular inspections. Here, shoes get check. Committee is a key factor in Blatz safety program.

Expanded-metal guards have been installed—

1. On labeling machines, which have many fast-moving parts.
2. Along quart bottle conveyor lines, because quart bottles are more subject to breakage than are smaller bottles.
3. Over exhaust and suction fans.
4. Around all gears and couplings, particularly in the power house and in the bottling plant. The latter has a large number of conveyors and, consequently, many gear boxes and couplings.
5. Around all fire sprinkler valves.
6. Around all electric motors.
7. In general, around all moving parts of all machinery.

Sheet metal or expanded metal guards have been installed over all pulleys, conveyors, and below the return belts of all conveyors.

Salvaged rubber and sections cut from automobile tires have been placed as covers over sharp corners and points of all conveyors, metal conveyor brackets and hangers.

In some cases, entire units are enclosed with expanded metal to prevent unauthorized persons from entering the immediate area. A gate with lock is installed and keys are given only to people who require admittance.

All electric substations are kept locked and keys are issued only to men responsible for maintenance.

Ladders are made of metal, and platforms used in raised working areas are equipped with proper railing and toeboards. This metal is serrated grating which prevents slipping and also provides vision from above and below. This type of platform is easily cleaned, a highly important factor in brewing.

All lights and extension cords used in the mill house, where large amounts of grain dust accumulate, have dustproof guards made of glass. Mercury switches are used on all electrical devices in the area.

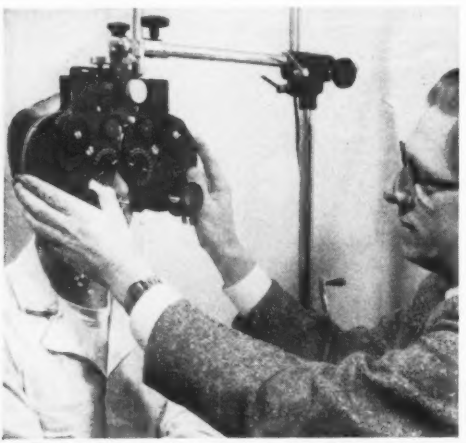
All new stairway construction work includes addition of carborundum to wet cement to form a non-skid surface in the finished work.

Motor Vehicles Kept Safe

Company motor vehicles, of course, always provide an accident potential, particularly when they come in numbers. The safety starting point here is the vehicles themselves. Our mechanics never cease their attention to every car and truck in the fleet. Routine 1,000-mile grease jobs and oil changes always are accompanied by a

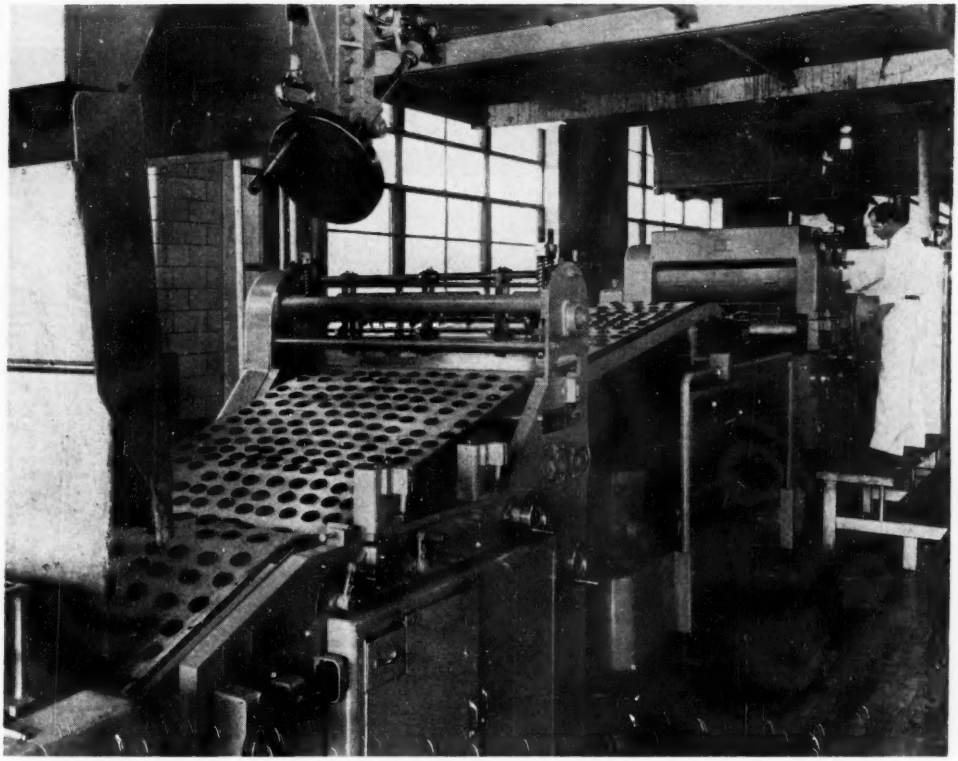
(*Turn to page* 179)

FINE MEDICAL facilities, such as those seen above, have contributed much to the Blatz safety record. Doctor (left) is examining an employee, while another physician and two nurses carry on routine work.



GOOD VISION—and its protection—is a first requirement of safety. Employee is seen being checked by optometrist prior to fitting of safety glasses.

PULMOTOR has proved valuable piece of safety equipment in brewery. Here, Blatz Safety Director Gregg Meyers uses it to aid employee.



OPERATIONS in plant of Farm Crest Bakeries, Columbus, Ohio, have been streamlined by coordinating speeds of conveyors, like these, with the electronic d.c. drives. Wafers are seen being fed into oven (behind operator).

Flexible D.C. Electronic Drives

They bring new coordination of equipment speeds, thus increasing efficiency of processing. Added benefits: Simplified layout, maintenance, sanitation

G. C. DODSON

Industrial Engineering Div.,
General Electric Co., Schenectady, N. Y.

Greater flexibility in operation of equipment—with simplicity of machine-component layout that provides low maintenance and improved sanitation—are benefits gained in food processing through use of electronic d.c motor drives.

Prime feature of these drives is new variable-speed performance through ready provision of adjustable-voltage d.c. power from an a.c. power supply.

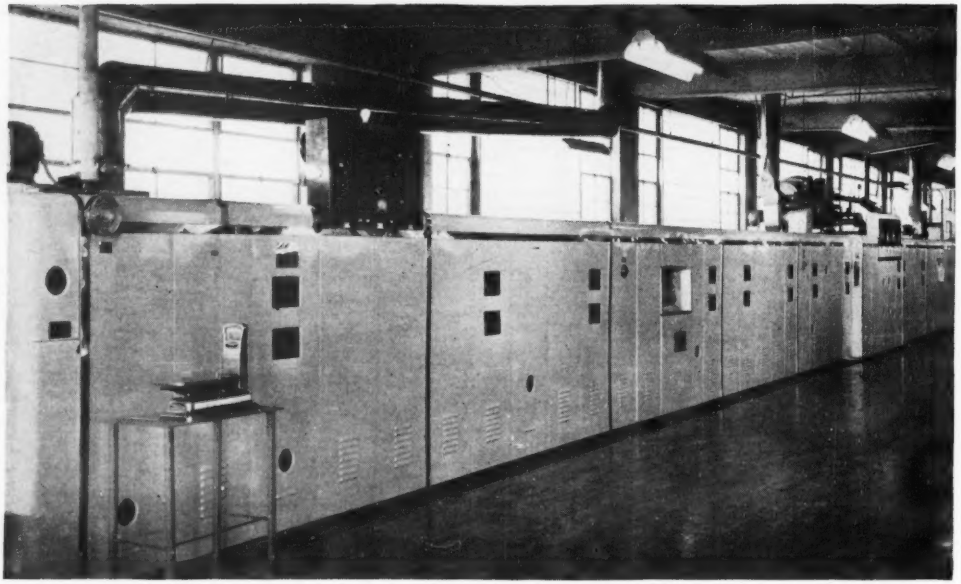
In the baking industry, for example, d.c. motor drives are playing an important role in making the process continuous. Adjustable speed is a basic requirement of continuous baking machinery. It is necessary for adjusting the baking time of band and traveling hearth type ovens. It is needed to adjust the speeds of auxiliary drives ahead of and after the oven. It is required for regulations that will allow the operator to run different kinds of baked products on a single machine.

At the plant of Farm Crest Bakeries Inc., Columbus, Ohio, four general types and a larger number of specific types of baked goods are produced on an 800-ft.-long continuous biscuit machine (outlined in Fig. 1). This machine is powered by seven electronic motor drives ranging from 1 to 7½ hp. It was built by the Baker-Perkins Co.

Base cake is prepared as: (1) Rotary molded biscuits, (2) rotary molded, solid bar stock for pre-oven cutting, (3) wire cut goods, or, (4) extruded bar stock, solid or filled, for post oven cutting (as for fig bars). These operations are done at the entry end of the machine.

As it is not uncommon to run all four of these general types of goods in the course of a day's work, it is imperative that adjustments of the drives be made simply, accurately, and

Oven operation is coordinated . . .



BAKING TIME on this 200-ft Farm Crest band oven, employing d. c. electronic drives, can be changed after one type of goods leaves oven. Thus, requirements for next run can be met without upsetting relative adjustments on cooler, stacker, and packer for remainder of first run.

quickly. And to operate with a minimum of personnel, the drives must all change speed proportionately when the oven baking time is adjusted.

When one type of goods leaves the oven, it is possible to change the baking time to meet the requirements for the next run and still not upset relative adjustments made on the cooler, stacker and packing table for the remainder of the first run. This point is emphasized by the fact that the machine occupies two floors of the building and the operator cannot see what is happening at the output end.

Applied to Fig Bars

An additional illustration of this type of coordination is in the production and cutting of fig bars. Once the length of bar cut is set by the operator, the fig bar cutter will automatically change speed to maintain the same bar length whenever changes are made in oven baking time. A consistent length of bar is important to packing a product for attractive merchandising.

The master, or group control, stations are located at either end of the band oven. From these, the operator starts and stops the oven and controls the speeds of all drives as a group. At each of the various sections, there is a control for starting or stopping that section and also for controlling its speed.

All of the electronic motor drives were furnished as standard units. The specific coordination for this installation is one of several that are possible from the panel by merely changing appropriate terminal board connections.

About five years ago the Keebler Weyl Baking Co. in Philadelphia installed four ½-hp. electronic motor drives to replace some adjustable pulleys and gear boxes on the delivery end of one of the production lines. The results were so satisfactory that when a new production line was added to the plant a short time later, it was specified that it be completely equipped with electronic drives.

This is a "cutting machine" type biscuit plant. The dough stock is fed into the entry end. The machine then automatically sheets, laps, gages, finishes, and cuts the dough. The base cake passes through the 300-ft. band oven, is carried through a cooling tower, then goes out to the breaking, stacking, and packing table.

There are 26 electronic drives used on this one machine, whereas 8 are used on the older machines. They range from ½ to 7½-hp. At the entry end of the machine, 18 of the drives operate the dough-forming elements. The system of coordinating them, arranged by Mr. Taylor, the bakery's electrical engineer, is this:

There are three control stations between the initial hopper and the entry end of the oven. They are spaced at uniform intervals along the line. From the station nearest the oven the operator can adjust all 18 drives proportionately as a group and can also operate the 5 drives nearest the oven independently. From the station preceding it (away from the oven), he can operate the 13 drives ahead as a group and can operate the next group of 5 drives independently. At the station farthest from the oven, he operates the remaining 8 drives as an independent group. Two other control stations are at the delivery end of the oven to operate the drives there in a very similar manner.

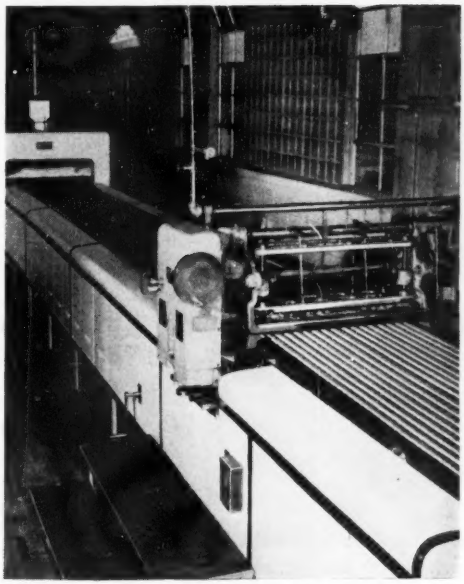
Clean Machine Made Possible

An orderly layout and clean machine have been made possible by these individual drives, and a minimum of drive equipment has been added to the machine. Further, equipment needed to effect adjustable speed is neatly isolated on a rack next to the wall.

At the time of purchase it was expected that maintenance on these drives would be practically negligible. Frankly the results have been even better. On the four ½-hp. drives first installed, it is estimated that the annual maintenance costs amounted to

. . . with cooler and cutter. Sketch shows hook-up

HERE, largest panel (at window) controls cooler motor (above). Operator adjusts stacker at end of cooler.



ACTION of this cutter is coordinated with speed of oven as fig bar stock, coming from latter, passes through.

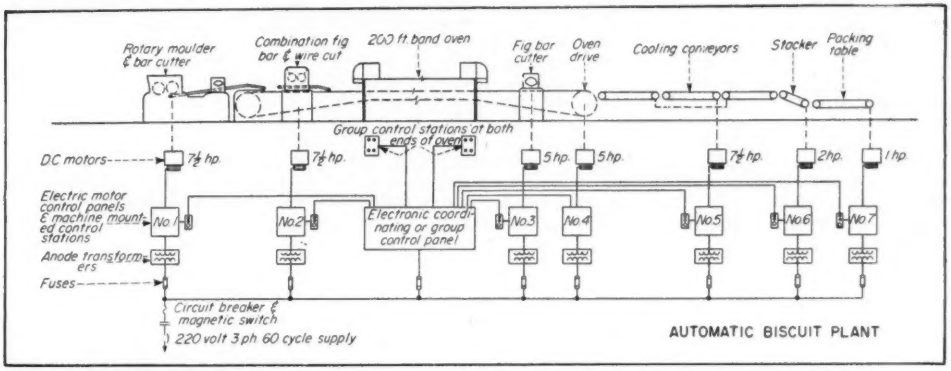


FIG. 1. SCHEMATIC DRAWING of Farm Crest's automatic biscuit plant shows how various mechanical components and electrical controls and drives are hooked up to work as a continuous machine. Flexibility of drives permits fast changeover to different types of baked goods.

about $9. Nor should this be surprising. For if equipment is arranged to facilitate maintenance work, it is expected that the preventive maintenance program will more successfully prevent serious failures. It follows that maintenance costs will be less.

Drive dependability has also been most favorable. To be fully certain the operation is reliable, one spare electronic control panel was installed for each of the four panel sizes used in the plant. The spare was arranged with connectors that would permit plugging it into the circuit replacing any faulted panel. It has not been necessary to use these spares since installation.

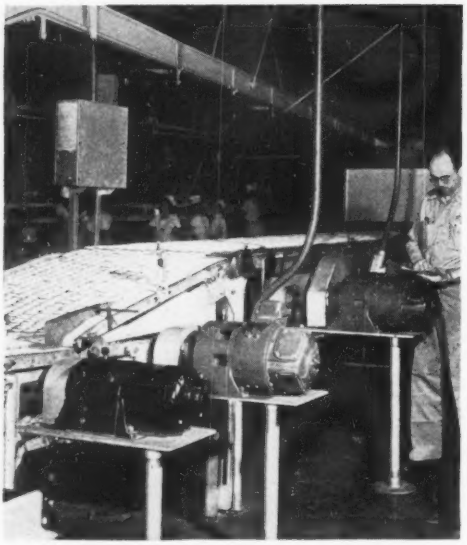
Logically, a tube failure is to be expected occasionally. However, failure of a gas-filled armature circuit tube does not interrupt operations. The other tube or tubes in the circuit continue to carry the load until tube replacement is convenient.

A failure of one of the seven vacuum tubes in the brain circuit is speedily corrected by immediately replacing all seven tubes—thus promptly restoring the drive to operation. Then the removed tubes can be checked at leisure to find out which one is unsatisfactory.

Steps in Bread Baking

An automatic bread bakery exemplifies an operation where the high performance and flexibility of the electronic motor drive are most valuable to the control of a critical part of the production line. Machinery for the bread baking process is distinctly

Only motors are on line . . .



SIMPLIFIED and uncluttered. Seen are "Thy-Mo-Trol" gear motors in Keebler Weyl Baking Co., Philadelphia.

. . . with panels out of way

PLACEMENT of controls on rack along side wall—away from machines—eases cleaning at Keebler Weyl.

different from that for biscuit making. The sketch of Fig. 2 roughly outlines the baking steps.

The process, so familiar to bakers, is this: Troughs of dough enter at the divider hopper (left in figure). The divider accurately proportions the dough into irregular balls, six pockets operating simultaneously. A short conveyor now carries the individual balls to the conically shaped rounder, where they are formed into smooth balls.

Next, a second short conveyor carries the dough balls to, and loads them into, the traveling racks of the dry proofer. After dry-proofing at 90 deg. F. for about 10 min. another conveyor carries the dough to the molder-panner.

Here each dough ball is rolled out flat and then cross-curled on the casting conveyor for automatic insertion into the pans. The nests of filled pans are automatically loaded into the 200-ft. final proofer in rows—6 nests per row. Final proofing calls for 100 to 110 deg. F. for about 1 hr.

Without changing their direction of travel, the pans are next moved into the faster moving "traveling tunnel" oven by an electro-magnetic transfer mechanism. Baking is at about 500 deg. F. for approximately 30 min. At the end of the 100-ft., oven, the bread is depanned, again employing an electro-magnetic mechanism.

The baked loaves now go through the continuous cooler built over the oven. Finally, a conveyor carries the finished loaves over a sorting table to the packing and slicing machine, and the final product is conveyed to the truck loading area.

The electronic motor drives play important roles in the operations of loading the pans into the final proofer, driving the final proofer, transferring the pans from the final proofer to the oven, and driving the oven. It is essential that the pans in the oven be spaced at uniform intervals to insure consistency of baking—and furthermore this interval must be maintained with accuracy regardless of changes that may be made in baking time. Lack of proper coordination of the drive functions would result in a hopeless confusion of pans, with crippled bread resulting.

Again this is a simple undertaking for the electronic drives. The first, 1 hp., is on the final proofer loader. In the second drive there is an electronic panel that controls two 1½-hp. motors, both driving the proofer chain —one motor at the entry end and one at the delivery end. The third drive, 1 hp., operates the transfer mechanism. The fourth, 3-hp., drives the oven chain. The oven and the proofer run continuously. The loader and unloader perform a cycle which is started by a signal that indicates a row of pans is ready for loading or unloading. The speed at which loading and unloading is carried out is coordinated with the speed of the proofer.

Any change the operator makes in proofer speed likewise affects the loader and unloader proportionately. When one baking run has cleared the proofer and is still in the oven, a second run can be started through the proofer. The necessary adjustment of proofer speed will automatically give proper adjustment to the loader and unloader without interferring with the first run still in the oven.

After the second run is in the oven, corrections of baking time can be made—and without causing pan confusion, since the three other drives will follow the changes in oven speed.

Triggered Transfer

Unloading and loading are cycled operations. The time of the cycle is coordinated with proofer and oven speed. The transfer device is triggered by a photo-electric relay which "sees" the arrival of a row of pans. A cam switch on the transfer starts the drive slowly to allow the pans to be picked up by the electro-magnets. The drive then operates at a higher speed to effect the transfer. Next, the drive is slowed down to a third speed preparatory to stopping at the "ready", or starting, position for the following transfer.

The flexibility in providing for these three different speeds, and the torque limit adjustments to prevent rough handling of the raised dough, are distinct advantages of the electronic drives.

A baking range of 5 to 90 min. is not uncommon for large ovens for cake

and roll production, and several chain conveyors are sometimes incorporated into a single traveling-hearth type oven. To accommodate the varied baking conditions required for cake and roll products, some bakeries call for drives providing reversal as well as wide speed range.

Equipment Minimized

Space saving, cleanliness, and ease of operation and maintenance are the benefits that made this a good application for electronic drives. It has been customary to crowd a constant speed a.c. motor, adjustable ratio pulley, a gear shift, reduction gear, tachometer generator, and three coupling assemblies, all into a limited space in the oven. But with electronic motor drive, the only space required is that occupied by a single compact gear motor, complete with tachometer, generator, and 132.35/1 ratio gear.

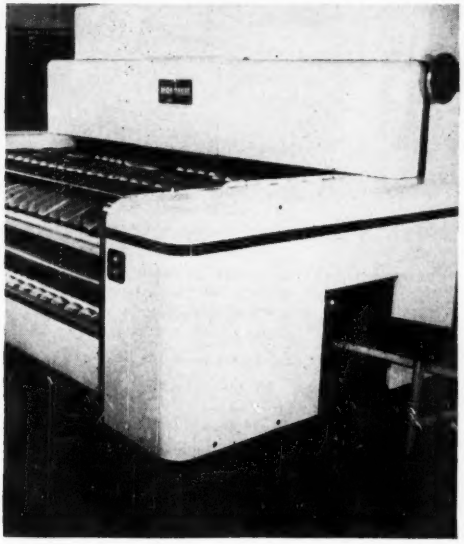
Thus, the equipment at the machine is kept at a minimum, and oven cleanliness and maintenance are facilitated. These are marked design and operating advantages.

The operator's speed-control device comprises a small, easily operated knob and dial which can be mounted at the most convenient location. Speed can be set quickly and accurately by watching the "baking time" speed-indicating instrument.

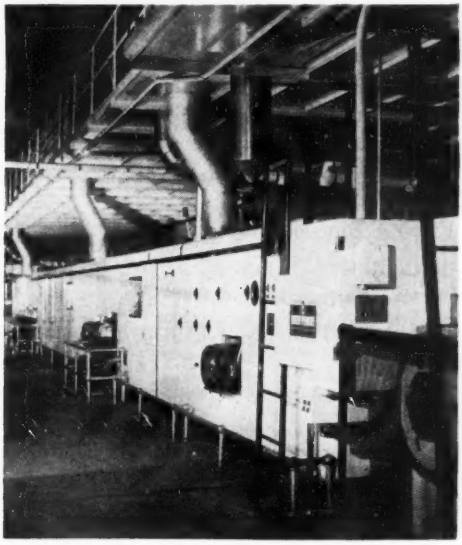
In order that reading may be made accurately from a distance, the tachometer instrument is furnished with a selector switch, giving the instrument two ranges with a scale for each range. The ranges are 90 to 20 min. and 20 to 5 min. To cover the 5-to-90 min. baking time range, electronic drives with 20-to-1 speed range (armature control only) were applied.

The larger bakeries do much experimental work on technics and machin-

Continuous bread ovens . . . and a d.c. layout



PROPER pan spacing in oven, to assure uniformity of bake, is maintained by drives. Depanning is automatic.



IN O'Rourke Baking Co., Buffalo, transfer of bread from the oven to the overhead cooler is automatic.

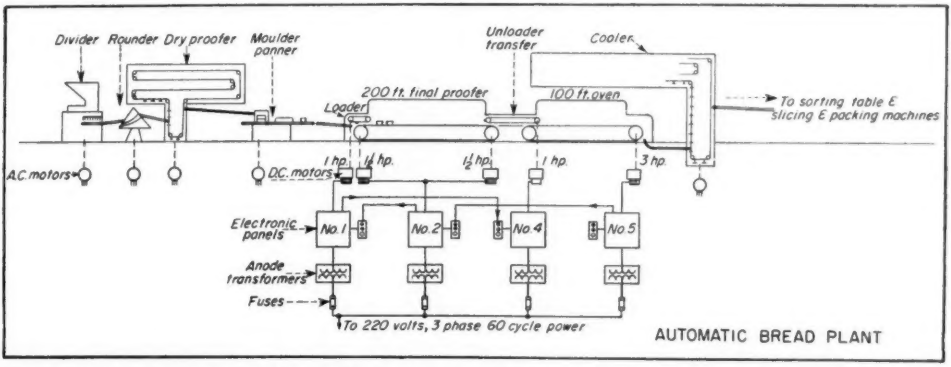
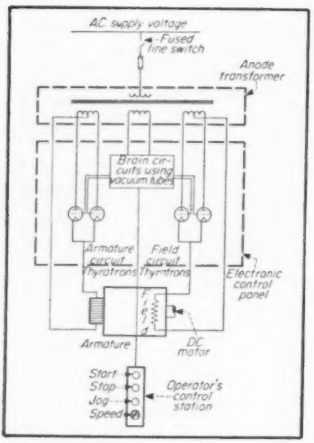


FIG. 2. AN AUTOMATIC bread bakery is outlined in this diagram. Electronic drives are used to coordinate speeds of loader and unloader, which operate on a cycle with continuously running proofer and oven. Any change in speed of one drive affects others proportionately.



LEFT: FUNCTIONAL arrangement of electronic d. c. motor drive, showing the four basic parts.

ery. Drives for this work must be easily handled and must lend themselves to different uses from day to day. They must have good performance characteristics. Because of the nature of experimental work, exact requirements cannot be accurately determined ahead of time, and drive investments must, therefore, be directed into equipment with the greatest adaptability.

Uses Mount

Consistent with the conditions is application of the electronic motor drive, which has been proven a useful tool in this capacity.

Electronic drive is not new—it was developed nearly a decade ago and its uses have constantly increased. Let us mention a few in the food industry.

It has proved useful to a manufacturer of can filling machinery. His requirement was to drive a sealer and a filler in the preparation of canned milk. Speeds of the two drives had to be regulated within ½ of 1 percent over individual speed ranges of 5-to-1, and with speed ratios between the two drives up to 4-to-1.

One of the most modern grain mills in the world uses electronic drives to operate proportional mixing controls for the precision blending of a variety of grains.

Manufacturers of potato chip machines likewise find the adjustable speed characteristics, cleanliness, and ease of installation and maintenance important for their product.

(*Turn to page* 170)

Sell That Oil in Citrus Seeds

Florida concentrators are exploring possibilities, which depend more on market prices than on technics

C. E. WRIGHT
FE correspondent, Jacksonville, Fla.

One of the opportunities for utilization of waste products in the processing of citrus juices, which a few of the Florida plants are considering, is the extraction of oil from citrus seeds.

This would only become economically feasible, however, when the price for citrus pulp as cattle feed is low in relation to the going price for vegetable oils.

One ton of seeds represents roughly one-third oil, one-third meal, and one-third hulls. At 15c. a pound for oil—the lowest price at which seed extraction becomes attractive—the return from a ton of seeds is therefore nearly $100. In addition, the meal brings about $1.50 per unit of protein, or about $40 a ton. The hulls are a waste product. Efforts to use them as fertilizer filler have not been completely successful, since they are too fibrous.

Price a Factor

Therefore, with a return from oil and meal, as indicated, the separation of the seeds from pulp for further processing into oil becomes a good commercial operation, particularly when the price of pulp is not high. The postwar high for pulp was $52, and the prices during the 1949–50 season fluctuated between $30 and $40.

On the present basis of a moderately low price for pulp and high prices for oil which under current world conditions may go higher, it has been found by some plants to be decidedly worth while to arrange for the extraction of the seeds from the pulp and the oil from the seeds. Recent prices of cottonseed oil and peanut oil have exceeded 20c. a pound, which of course makes the oil extraction even more attractive. However, since the end of World War II, oil has been as low as 12c., at which level the oil extraction becomes a doubtful proposition.

The operation for removal of seeds from pulp is a simple one, requiring no special equipment. One company uses a panel-type finisher and then a rotary dryer such as is used to dry pulp. The only difference is that the seeds alone dry at a slower rate than the pulp itself and therefore have to be dried separately.

The companies that have experimented with oil extraction have not done this work in their own plants because the operation requires equipment of a type they do not have. Accordingly, they ship the seeds to oil processing plants, usually on a custom basis. For the small tonnage of seeds that could be obtained in an average-size citrus plant during a processing season, it would not pay the citrus companies to set up special equipment for this purpose.

One company, for example, ships its seeds to a peanut oil plant, while others have the work done at a tung oil plant. The peanut oil plants extract the oil by pressure, which results in the seed being completely hulled and the residue entirely separated from the oil. Tung oil plants generally use an expeller process, leaving the meal and the hull together, resulting in a meal with a lower protein content.

Leave Some Seeds

In the process of removing seeds from citrus pulp, all the seeds are not recovered. Some are purposely left in because the feed manufacturers want a portion of seeds for their protein content. Usually enough remain so that the protein will not drop below 6 percent, and of course the process does not remove them all anyway. Some are crushed.

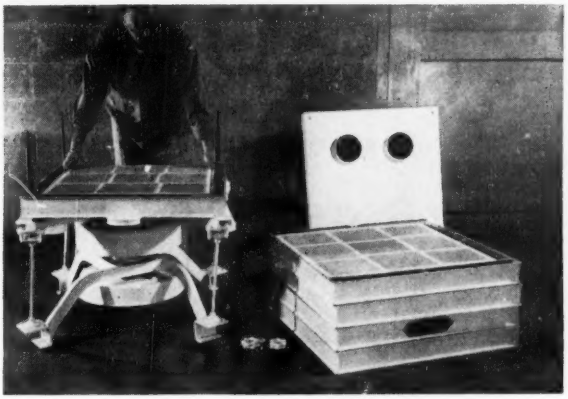
Moreover there is this factor to contend with: Many oranges, of course, are of the seedless variety. Out of 50,000,000 boxes probably not more than 25,000,000 boxes contain seeds.

If all of these 25,000,000 boxes were processed for seed removal and extraction of oil, the result for the entire industry, would probably not be much over 8,000,000 lb. of oil in a season. At an average rate of 15c. a pound, this would mean a revenue of $1,200,000 in a season, not counting the return from the meal.

One company official explains that oil had reached 25c a pound before his organization became interested in this phase of waste recovery. Such a level cannot be counted on at all times. For instance, cottonseed oil, though relatively high in the past few years (27c. in 1946, 37c. in 1947, and 40c. in 1948), hit a low of 4¼c. a pound in 1939.

NEW EQUIPMENT & SUPPLIES

Compact unit . . .



. . . is easily disassembled for cleaning

High-Capacity, Sanitary Sifter Needs Little Space

This new high-capacity all-metal sifter is a distinctly advanced machine in design and construction. With outer housing or box eliminated, compactness is featured.

Called the Circle sifter, it was developed to simplify sifting operations for bakers, candy makers, and many other food processors. Designed for sifting dry free-flowing granular products, the machine weighs approximately 400 lb. It features a balanced driving mechanism and quick, easy sieve assembly.

To take the unit apart simply requires removal of the hand screws, lifting off of the hold down box, and sliding of the sieves up and away from the tie rods. Assembly is just as easy. Sieves slide readily through the vertical tie rods, fitting snugly atop one another. The entire operation takes just a few minutes. Down time is cut to a minimum for changing or cleaning of sieves.

Sifter is driven by a counterbalanced mechanism which imparts a gyratory motion to the sieves. This motion causes all parts of the sieves to move in identical circles, therefore all sifting area in the sieves is equally active in effecting separation of different size particles.

Because sifter's driving mechanism is balanced and mounted in anti-friction bearings, a fractional horsepower motor and one Texrope belt are adequate to drive the unit. Driving sheave is located approximately 4 in. from the floor, permitting thorough cleaning under the machine.

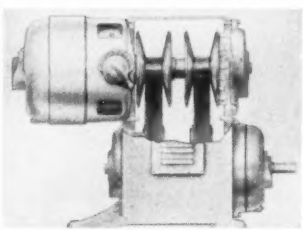
Sifter is designed for a stack of three, four or five sieves. Number of sieves used depends upon products sifted, the required capacity, and the screen mesh used.

In operation, the sieve stack is gyrated in a 1½- or 2½-in. circle. Operating circle can be changed from one diameter to the other by merely loosening the offset mechanism and rotating it 180 deg. A simple redistribution of counterweights again places the sifter in properly balanced operation.

Relative motion between the sieve stack and the sifter base is made possible by the flexible rubber mounts on the upper and lower ends of the sieve-stack supporting rods. Rubber mounts are designed specifically to give the sieves a smooth gyratory motion.

In rebolting operations, practically all of the particles pass through the screen. Consequently, two channels are provided for the "throughs" and one for the "overs." The "throughs" outlets are located on the right and left of the motor side of the sifter, and the "overs" are discharged on the side opposite the motor.—*Allis Chalmers, Milwaukee, Wis.*

Variable Speed Motor Employs Dual Belts

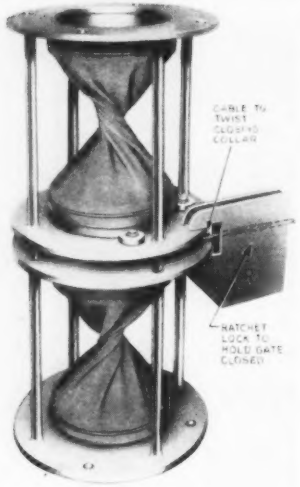


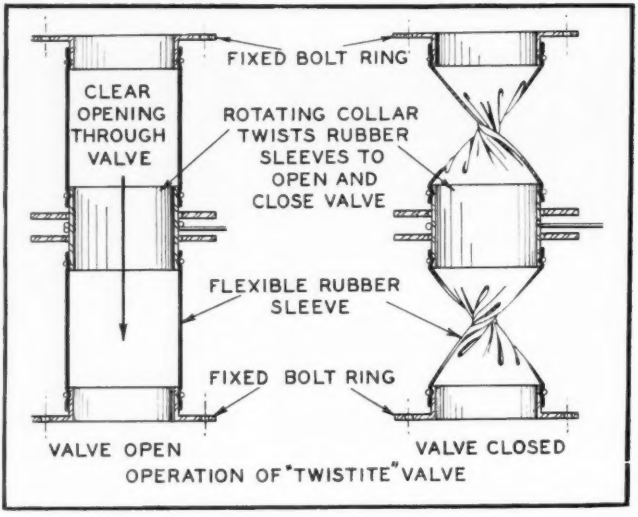
Recently developed is a new line of extra heavy duty motors for variable speed. Ratings of the units run as high as 50 hp.

To carry the heavy load through the internal speed-changing transmission, engineers have incorporated dual varibelts, thus distributing the load so that no undue strain is imposed. To counterbalance belt load, a tension control, known as Autotaut, has been designed. Principle here is to avoid the disadvantages of variable center drives or extra flexing of the belts over the idlers.

A calibrated spring is employed to maintain pressure between the two halves of the driven varidisks and the sides of the belt. The spring takes up any slack that might be caused by stretch or wear of belts. Use of dual belts does not affect ease of changing motor speeds, which is accomplished by merely turning a control dial.—*U. S. Electrical Motors, Inc., 200 East Slauson Ave., Los Angeles 54.*

Bin Valve Is Completely Dust-Tight





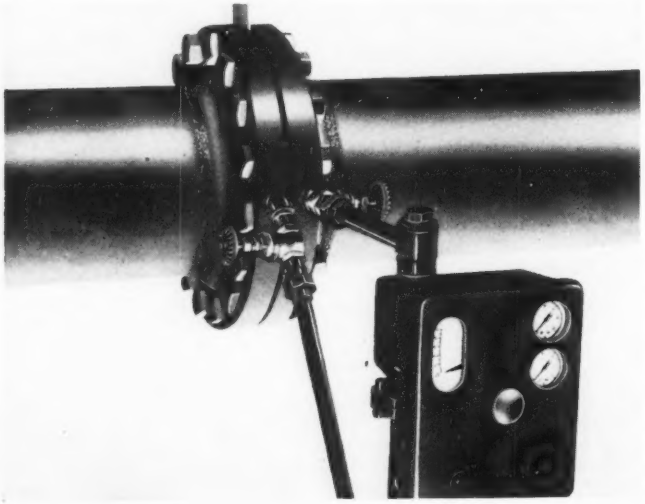
Opened or closed, this now "Twistite" double-closure bin valve is completely dust tight, says maker. It consists of two rubber sleeves joined by a rotating steel collar.

Dust and drip-tight closure is obtained by pulling on a cable wrapped around the rotating collar, sealing the opening with a twist in each of the ruber sleeves. Valve is self-opening. Elasticity of rubber sleeves causes them to immediately resume their cylindrical shape when tension on the cable is released. Flexible rubber sleeves wrap themselves easily around lumps caught in valve during closure, and prevent any leakage due to variation in size of material particles.

Valve can be hand-controlled locally by mounting a ratchet lock to hold cable in closed position. Remote hand control can be obtained by mounting ratchet lock at any desired location and running control cable to it by a simple pulley arrangement. It can also be controlled automatically by use of a small actuating motor.

The standard 6-in. valve weighs 35 lb. with the ratchet cable-lock mounted on valve frame. It will handle lump sizes up to 2½ in., and it requires a 30-lb. cable pull for closure. Other valve sizes are available on request.—*Stephens-Adamson Manufacturing Co., Aurora, Ill.*

Variable-Area Kinetic Manometer Is Highly Accurate



The V/A Cell (variable-area metering principle) kinetic manometer is claimed to combine the advantages of the area meter and the orifice meter while eliminating disadvantages of each.

It is a precision flow transmitter developed for differential pressure applications. It measures a by-passed portion of the main-line flow of liquids, gas, and vapor streams including steam. Float, of the "free-type", is constructed of 316 stainless steel.

Reported to have high accuracy, the manometer features a wide-range linear scale. It is mercuryless and does not utilize any diaphragm. Manifold systems, bellows, seals, exterior purges, condensate chambers are eliminated.

A change in the flow range of the instrument is accomplished with a screwed range tube quickly installed in the high pressure tap. You can get differentials of 50 to 1,400 in.—*Fischer & Porter & Co., Hatboro, Pa.*

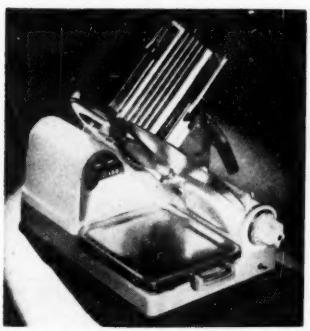
Dusting Starch Curbs Insects

Designed to eliminate the problem of insect infestation in the overhead proofer and rounder is an odorless, tasteless, white and free flowing starch processed from corn, used as a dusting medium for bread, roll and sweet dough. Its effectiveness is based on the fact that corn starch will not support insect-life.

The new product, called Amaizo Dusting Starch, is stated to sustain sanitary conditions in the rounder, proofer and associated equipment for prolonged periods. It will not carry larvae as does most farinaceous materials.

A reduction of from 25 to 50 percent in the amount of dusting agent used is claimed. This will result in less dusting material accumulation and longer periods between clean-outs.

To use the new dusting medium, baker should clean all equipment throughly, then refill dusting hoppers. The starch is packed in 100-lb. multi-wall paper bags.—*American Maize-Products Co.*, 100 *E.* 42 *St.*, *New York*



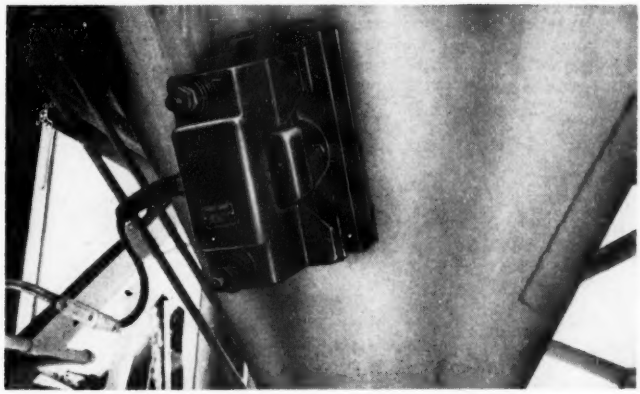
Scale-Slicer Employs 5 Kinds of Plastics

Clean-line appearance and operating ease are provided in a new slicer, Model 5400, equipped with the Quick-Weight Estimator and brilliant platter illumination.

Slicer incorporates more plastic parts than any previous food machine. Use of plastics aims to emphasize clean-line construction. Eight plastic parts involved represent five different materials; namely, Plaskon, Lucite, Polystyrene, Bakelite and Ethyl Cellulose. Precision-molded by Continental Can Co., parts are quickly removed without tools for cleaning.

Slicer is finished in distinctive white and grey.—*Toledo Scale Co.*, 1029 *Telegraph Rd.*, *Toledo* 12. *Ohio.*

New Vibrators Are Much Quieter



Electric, semi-noiseless models have been added to the Syntron line of bin, hopper and chute vibrators.

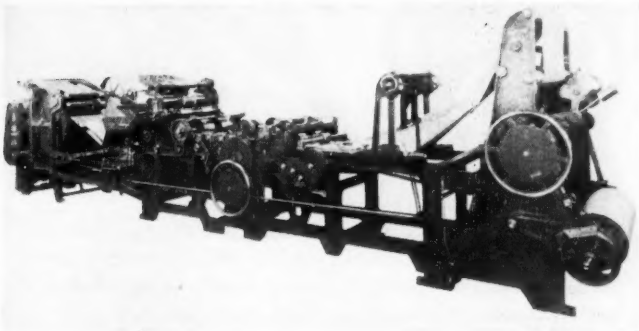
The new units perform the same function as the standard models, with a sharp reduction in operating noise, making them especially useful on interior bins, hoppers and chutes where large numbers of employees work.

Reduction in operating noise is due to a design change in which the metallic striking parts have been eliminated and new rubber bumpers substituted.

Vibrators are available in four models, ranging from the size for use on small hoppers containing as little as 20 cu. ft. of material up to bunkers holding hundreds of tons. They operate from 110v., 220v., or 440v., a.c.

They are all furnished with a variable controller by means of which the intensity of vibration can be regulated to suit the material being handled.—*Syntron Co.*, *Homer City*, *Pa.*

New Machine Forms Wide Range of Bags



A wide range of sack sizes can be produced by this recently introduced bag-making machine. Sizes of bags start from 7½ in. wide by 10.68 in. tube length by 2⅝ in. bottom width, to a maximum of 17 in. wide by 28.58 in. tube length by 6 in. bottom width. Thus, prepackagers of foods can adapt this unit to many applications.

New features are a three-station drum for increased speed and a rotary cut-off that substantially reduces noise levels. Latter makes a finer serration on the lip of the finished bags.

An adjustable former varies the width of the sack, replacing individual formers. Easier loading is accomplished with a new taper roll lifting device.

An aniline press can be directly connected for making multi-colored printed sacks in one operation. Register of pre-printed paper with the bag machine cutoff is assured with compensators and electric eye equipment. Duplex bags can be made by adding a liner attachment.—*Potdevin Machine Co.*, 1285 38th *St.*, *Brooklyn*, *N. Y.*

PROTECTION AND *Beauty*

GAZELLE—A small antelope that races and leaps across the African veldt with almost incredible speed and grace.

RHINOCEROS—A hulking horned brute with the body of a tank, a temper like TNT, and a face like a nightmare.

KVP *Papers* for the FOOD INDUSTRY

When you spend so much time and care in processing quality into your foodstuffs, it's just good common sense to protect it until it reaches consumers' tables. The better you preserve food flavor and wholesomeness, the better your prospects for steady, repeat sales.

KVP Papers, with their almost infinite number of applications, can help keep your products clean and fresh for consumer satisfaction. KVP artists and printers can add sales-stimulating designs that help keep your products selling at a more profitable pace.

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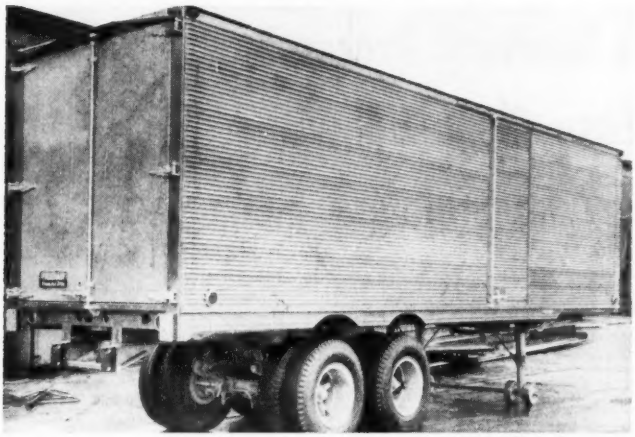
Stainless-Steel Trailers Feature 5 Major Changes



Now in production, this 1951 line of stainless steel trailers embodies five major improvements.

The changes are as follows: Stainless steel cross members are now spaced at 18-in.; rear bumper ground clearance has been dropped to 30 in.; landing gear bracing has been augmented; twin tail and stop lights are now employed; and an improved, self-contained sealed-tight unit for all clearance lights has been incorporated.

The 18-in. spacing of cross members (they were formerly on 24-in. sections) provides increased strength for fork-truck, or "mule", loading of freight. The lower rear bumper (earlier clearance was 35-in.) is intended to provide additional protection against dock damage.

Improvement in landing gear supports also was engineered with fork-truck loading operations in mind. The double tail and stop lights offer operators additional safety by eliminating possible confusion in signals to following vehicles. And the new clearance light units are designed to give longer service and have lower replacement cost in event of breakage.—*Fruehauf Trailer Co.*, 10956 *Harper Ave., Detroit* 32.

Want More Information?

It's free—and easy to get. Simply note here the items on which you want more details, then turn to the Reader Service Section inside the back cover, where all are listed by pages and by subjects under, "Editorial: New Equipment, Supplies"—each one with a page key number after it. The key numbers also appear on the handy Reader Service postcard. So you circle those for the items that interest you, sign at the bottom, and mail. No postage is needed.

Recorder Measures Rotor Temperature

Accurate and quick measurement of the temperature of rotors in large electric generators can now be made with an electronic recorder, recently developed.

Unit has been designed to provide a better and more economical instrument to assist operators in avoiding overloads. In addition, instrument furnishes a 12-in. strip chart record which can be used as a guide for gradually cooling a generator.

Recorder has a range of 0 to 150 deg. C., a limit error of 1.5 deg. C., a dead zone of 0.3 C., and a pen speed of 1.4 min. full scale. Its range of rotor winding resistance is 0.1 to 4.0 ohms and it has a dielectric test of 1,500v. rms. for 1 min.

In designing the new instrument, special consideration was given to users who, generating large volumes of their own power, want maximum safety and dependability for peak capacity operation. Recorder is made as a special product, with deliveries in about 90 to 120 days from receipt of orders.—*Brown Instrument Div., Minneapolis-Honeywell Regulator Co., Philadelphia.*

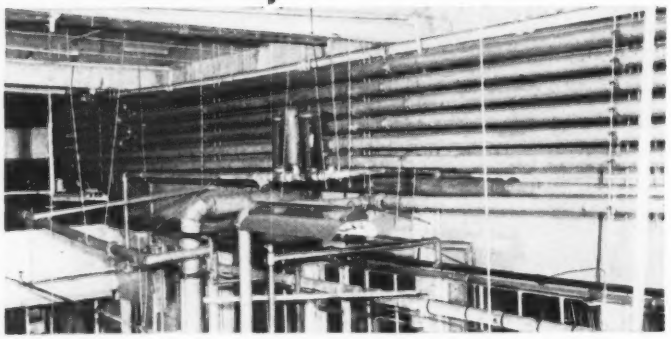
Two-Piece Coupling Opens, Closes Fast

Less than a quarter turn is reported required to open and close this two-piece, self-positioning, coupling unit.

Consisting of a body with three tapered locking lugs and mating male or female tail piece or hose spud, the coupling, called the J. S. Quick, is available in aluminum, high test bronze, stainless steel, and Ni-Resist. Sizes range from ½ to 6-in. inclusive.

Coupling is termed shock and vibration resistant due to matching taper on the handle ring locking lugs and tail piece locking flanges. Gasket wear is minimized because flat tail piece face is pressed straight against gasket without twisting action and is locked to gasket under pressure when connection is made. Gasket is held in place at all times through use of an undercut in body. Standard couplings take up to 150 psig.—*The Mead Cornell & Co., Cleveland* 7.

You Get Sanitary Processing plus Easy Clean-Up with *Carpenter* Stainless Tubing



◀Hydraulic pressure blancher suspended from ceiling to save floor space. Temperature is regulated by controls which pass live steam through the jacket around perforations in the tube. Foods in process travel 1,100 ft. through the 4" dia. Carpenter Stainless Tubes. Product quality is safeguarded and clean-up time is low because of the smooth I.D. surfaces of Carpenter Stainless Tubing.

To help you conserve Stainless and get best possible fabricating results, Carpenter has published a new Slide Chart on Bending Stainless Tubing and Pipe. It shows desirable radii for bends of 45° to 180°, coil diameters for ⅛" to 4" Stainless Pipe, etc.

A note on your company letterhead will start this new Carpenter Slide Chart on its way to you.

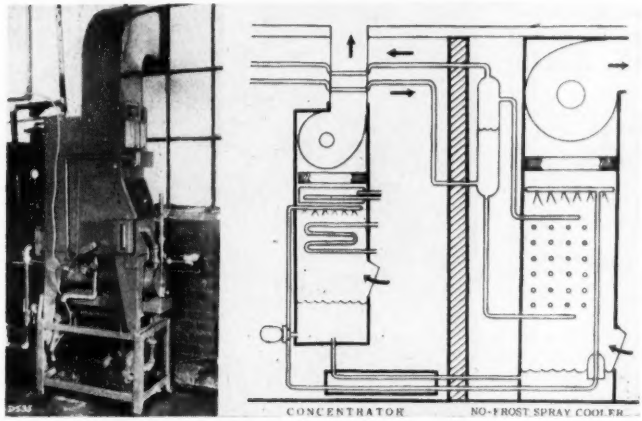
THE CARPENTER STEEL COMPANY
Alloy Tube Division, Union, N. J.
Export Department: Carpenter Steel Co., Reading, Pa., "CARSTEELCO"

Carpenter

STAINLESS TUBING

—guaranteed on every shipment

Provides Low Temperatures Without Frost



Stated to refrigerate products to temperatures as low as —30 deg. F. without interruption for defrosting, the improved "No-Frost" unit is specially designed for cooling cold test rooms, for cold processing such as in quick freezing of foods, and for general chilling and cold storage of products.

Compact equipment consists of a spray cooler that supplies a controlled cold air stream at sub-zero temperatures by means of passing air over refrigerated coils. The latter are prevented from accumulating ice or frost by steady spray of non-freezing liquid.

To keep this process automatic and continuous, the non-freezing liquid is maintained by constant removal of the moisture that is condensed out of the atmosphere by contact with the refrigerated spray. This is done in the unit's concentrator, now improved by the adoption of a newly designed apparatus employing a completely new method.

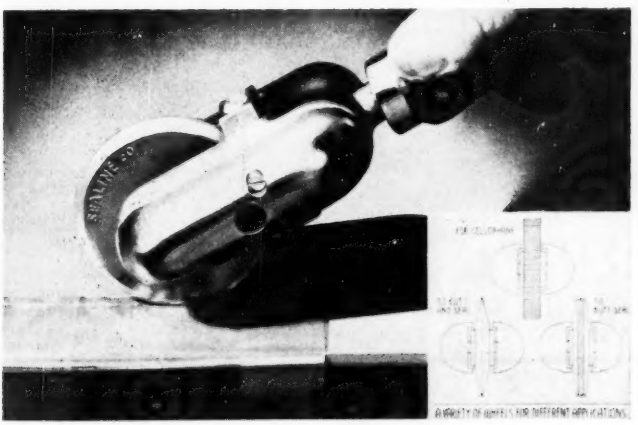
A portion of the solution, as it is continuously being diluted by the condensation of water vapor in the spray cooler, is pumped to the concentrator. Here, water is removed by evaporation, the diluted solution being sprayed in a chamber through which air is drawn by fans and a heating element raising the air temperature, promoting evaporation. The water evaporates at a much higher rate than the non-freezing liquid by reason of vapor pressure differences.

In a second stage, re-concentration is accomplished above the spray nozzles, with the air stream, which now contains the evaporated water vapor and some non-freezing liquid vapor, being cooled by a reflux coil. The increase in the relative humidity of the air stream forces condensation of the non-freezing liquid vapor. The re-concentrated No-Frost solution is returned to the spray cooler.

New concentrator replaces older types in which water was removed by heating above boiling point. It has the advantages of operation at lower temperature, increased capacity in smaller space with more compact equipment, simplified operation with less attention, easier maintenance, with shut-down time for cleaning minimized.

Concentrators will be made in a wide range of sizes, with water evaporating capacities ranging from ½- to 75-gal. per hr. A single large concentrator will serve a battery of several large spray coolers.—*Niagara Blower Company*, 405 *Lexington Ave., New York City* 17.

New Sealer Readily Handles Odd-Shaped Objects



An entirely new method for direct heat-sealing of Polyethylene, Pliofilm, and other thermo-plastic films, has been announced.

Field tests with the new "Sealine" 50 hand sealer are reported to have shown high performance of its 2½-in.-dia. free-rolling heated wheel in sealing odd shaped objects as well as for end-sealing of bags. The wheel was designed to make it possible to get over and around areas heretofore unreached.

Available are a variety of wheels for different applications, including sealing of cellophane bag ends, butt-sealing thin vinyls, and cutting and sealing other films.

Weight is less than 1 lb., and a large and comfortable grip makes it easy to handle. Safety rest keeps roller off table or bench when not in use.

Unit makes use of a special fluid which is automatically fed to the heated wheel through a wick arrangement. A few drops are stated to be sufficient for several hours of sealing.

Temperature is adjustable, and accurate from 200 to 450 deg. F. Heating element uses only 50w. Operation is on either a.c. or d.c. current.—*Sealine Manufacturing Corp., 170 N. Peoria St., Chicago 7.*

Ask any Dietitian—she'll tell you

"Enriched Foods and Fortified Foods are *Preferred* Foods"

AMERICAN dietitians and nutritionists long ago added their endorsement to the Bread and Flour Enrichment Program. And again they have been proved right by the results of the large-scale Newfoundland Nutrition Surveys.

These authoritative surveys reaffirmed that enriched and fortified foods promote better bodies, *healthier* bodies, sharply reduced infant mortality, lower tuberculosis and over-all death rates—improvement in both the quantity and quality of life.

When you enrich and fortify with Merck Vitamin Products you *know* that the faith of millions of Americans is fully protected. Merck Vitamin Products come from the same organization that pioneered in the research and large-scale development of thiamine, riboflavin, niacin, vitamin C, and other important nutrients. And now, the most recent contribution is thiamine mononitrate, a form of thiamine that has the advantage of greater stability in certain food applications.

With the enrichment program, as well as general food fortification, steadily growing in stature, Merck continues to lead in every distinct, forward step.

Merck Vitamin Products for Enrichment and Fortification

VITAMIN B_1
Thiamine Hydrochloride · Thiamine Mononitrate

RIBOFLAVIN (Vitamin B_2) **NIACIN** (Nicotinic Acid)

ASCORBIC ACID (Vitamin C)

Merck Enrichment Ingredients for Millers, Bakers, Cereal and Macaroni Manufacturers · Merck Vitamin Mixtures for Flour Enrichment · Merck Bread-Enrichment Wafers · Merck Vitamin Mixtures for Corn-Products Enrichment · Merck Vitamin Mixtures and Wafers for Macaroni Enrichment.

Merck Knows Vitamins

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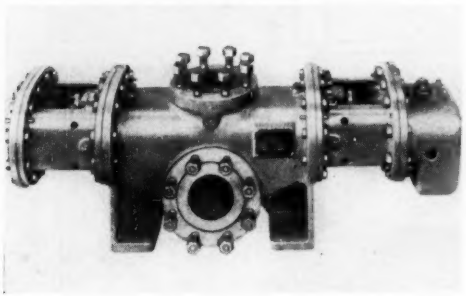
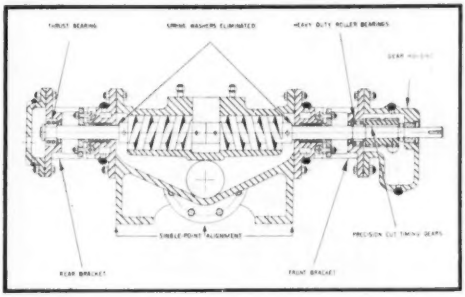
Screw Pump for Positive Displacement of Viscous Liquids





Greater durability, easier installation, and faster servicing are reported with use of a new external gear and bearing bracket type screw pump for positive displacement of non-lubricating liquids of all viscosities at 1 to 700 gpm.

Notable among new features are pump's single-point alignment, and "dual-controlled" rotors. External timing gears and all bearings are in housings, which form an integral unit with pump body. Thus there can be no strain on bearings or misalignment of shafts or rotors due to change of respective positions of pump body and separate housings.

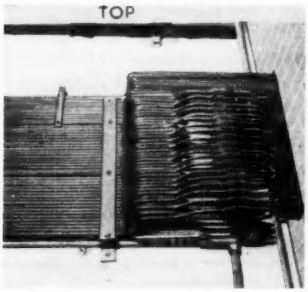
Timing gears and bearings move with pump body, if there is a slight displacement of the pump elements during installation, or if pump body expands when handling hot materials.

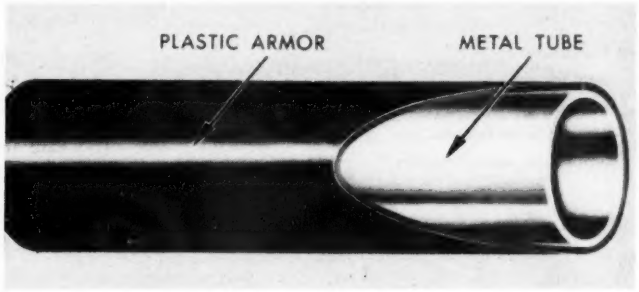
For less wear on bearings and timing gears, rotors are positioned axially as well as radially. Axial control is provided by new thrust bearings—in the form of double-row angular contact ball bearings—at the outboard end. These bearings reduce sliding wear on the timing gears, and reduce friction by making possible the elimination of spacing washers between pump body and brackets. Radial control is provided by precision cut timing gears, and newly added heavy duty roller bearings.

Servicing is speeded by new one-point alignment feature, and by new bracket arrangement, which allows faster assembly. Trial and error methods are unnecessary, because all parts are automatically positioned by shoulders and locknuts.

New pump can be direct-connected up to 1,800 rpm. It is available in horizontal or vertical construction, in corrosion resistant alloys, and with steam jacketed bodies and special stuffing boxes and bearings for high temperature applications. Hopper type bodies are available for extremely high viscosities.—*Sier Bath Gear & Pump Co., Inc., 9252 Hudson Blvd., North Bergen, N. J.*

Plastic Armor Protects Tubing Subject to Corrosive Atmospheres





Announced is a new service for plants using instrument tubing or fluid transmission lines subject to moisture or corrosive atmospheres. Manufacturer now offers to extrude a coating of vinyl or polyethylene over customers' tubing by the patented Dekoron process. Tubing will be coated, before installation, in company's Ohio plant.

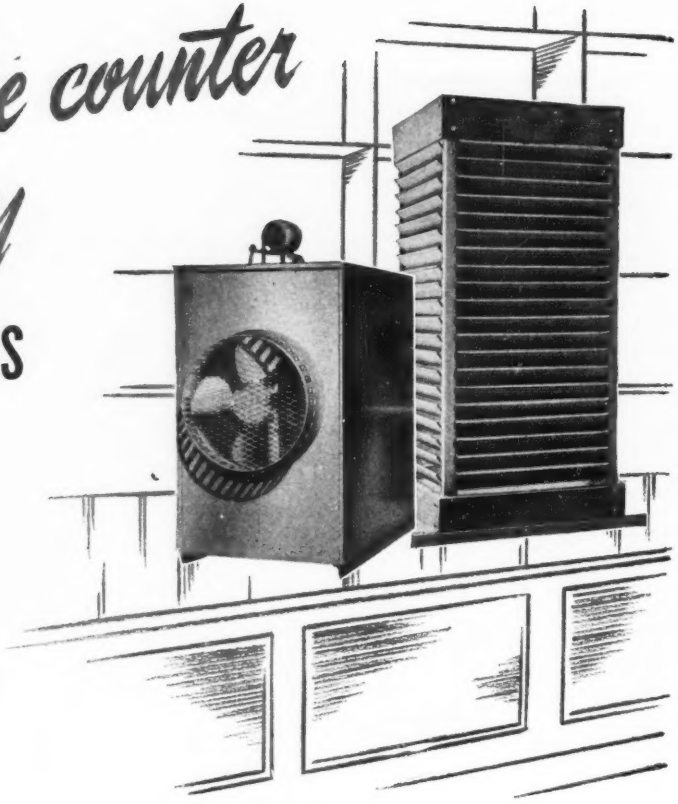
The thick plastic armor sheath, which can be extruded over steel, copper or aluminum, is stated to be chip-proof and to render the metal tube virtually impervious to moisture, salt air, acids, alkalis, or corrosive industrial atmospheres.

Dekoron is stated to have given excellent results in one of largest chemical plants in the East. In one outdoor application, sulphuric acids form on instrument lines and the air carries isoproponol sulfates. Ordinary steel tubing with .030-in. wall failed in less than a year, while tubing made of vinyl chloride over copper is reported still good after 2½ yr. service.

Tubing is made in sizes ranging from approximately ⅛-in. O.D. up to 3-in. Thickness of plastic armor can be varied from 15 thousandths of an inch up to practically any dimension required by service conditions. Company is prepared to coat copper, steel or aluminum tubing, either in straight lengths or in 50-ft. coils.—*Samuel Moore & Co., Mantua, Ohio.*

Over the counter delivery on

AQUATOWERS *and* SERIES 100 NATURAL DRAFT TOWERS



AVAILABILITY is a prime factor for consideration in most equipment today — so it is in water cooling towers for the multitude of three- to fifty-ton jobs this season.

Marley's anticipation of 1951 demand, however, precludes any compromise in quality . . . the finest towers are yours when and where you need them.

AQUATOWERS and SERIES 100 Natural Draft Towers *are ready* . . . in stock awaiting your orders. Service-proved in thousands of installations, these towers are accepted as the standard of the refrigeration and air-conditioning industries. Both types of towers are economical to install and to operate.

There's a size for every job . . . for new construction or for operating improvement of existing installations . . . for location indoors or outdoors.

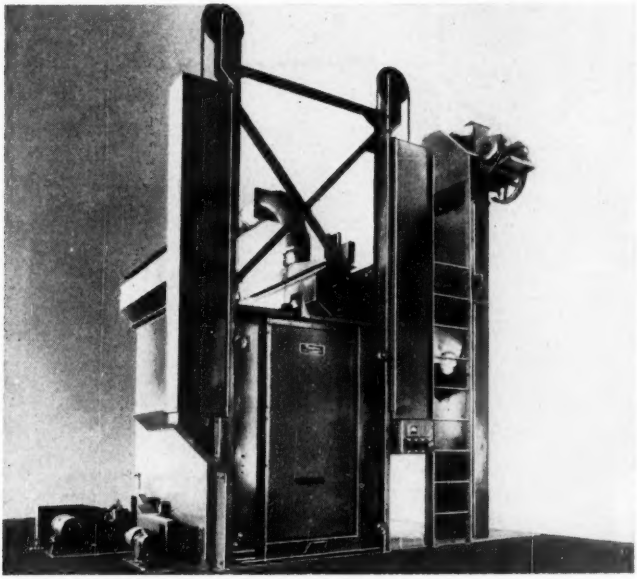
For complete information contact your nearest Marley representative (one in every large city) or write for Bulletins AQ-50 and 100-51a.

Also Producers of
DRICOOLERS
VAIRFLO TOWERS
DOUBLE-FLOW TOWERS
INDUSTRIAL SPRAY NOZZLES

The Marley Company, Inc.

KANSAS CITY 15, KANSAS

Machine Quickly Cleans Metal Drums



Removal of dirt, rust, paint, and other foreign materials, from 30- and 55-gal. returnable steel drums and lids, before their re-use, is simplified and speeded with use of this Rotoblast drum cleaning machine.

Metal abrasive, hurled against both the interior and exterior surfaces of the drum by centrifugal force will scour the metal in seconds, leaving no chemicals or alkalis to wash off, and providing a clean bonding surface for repainting. Drums are automatically handled during the cleaning operation, and only one man is required to load and unload the barrels.

Two models are available. Model ES-400 is designed to clean 1,000 to 1,100 drums and drum heads a day, or 125 to 140 per hr. And Model ES-382 will clean 320 to 560 drums and covers per day, or 40 to 70 per hr.

Both units clean on the same principle—the throwing of metallic abrasive against the surfaces by vaned wheels that turn at 2,300 rpm. The cleaning cycle takes from 50 to 90 sec., depending upon nature of material to be removed, and facility with which operator loads and unloads.

Handling is Different

Drums are handled differently by the two machines during the cleaning operation. Larger model employs a table divided by a partition. On either side of partition are cabinet holders for drums to be cleaned. And while one drum is being cleaned in cabinet, other cabinet is exposed for unloading the barrel just cleaned and loading next drum to be cleansed.

Smaller machine consists of a cabinet inside of which are a table and rollers. Operator places a drum on table, and drum cover is placed on rollers provided. He closes the door and pushes starting button. Cleaning proceeds automatically while operator brings up next drum for cleaning.

Spent abrasive, mixed with material it has scoured from drum, is cleaned of all dirt and broken particles by a separator and returned to the machine for re-use.

To prevent possibility of accidents, automatic shut-off valves on both machines prevent any flow of abrasive when partitions or doors are open. Sanitary, safe working conditions are provided for operator.—*Pangborn Corp., Hagerstown, Md.*

Pocket-Size pH Meter Is Self-Contained

Instant, on-the-spot pH determinations anywhere are now possible with a revolutionary, pocket-size pH meter and companion probe unit.

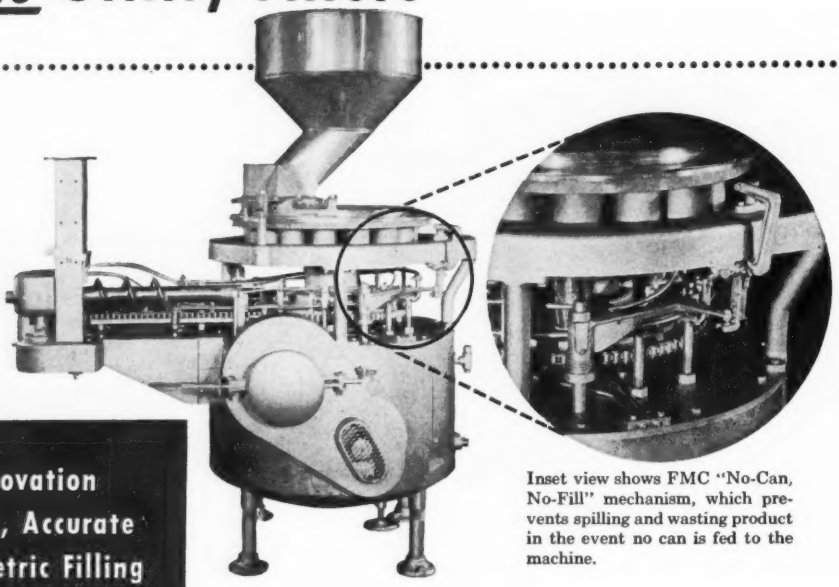
Completely self-contained, with batteries, in a Bakelite body 3 x 5⅞ x 2½ in., this instrument is furnished, camera fashion, in an ever-ready carrying case. Novel plastic tubes of buffer and KCl solutions are included. Total weight is 3 lb. Both water-proof and fungus-proof, the carrying case comes with a strap that permits it to be slung over the shoulder, leaving both hands free.

Supports and beakers are eliminated by combining the calomel and glass electrodes with the sample holder in a single polyethylene probe unit. This idea of "doubling" sample holder and electrodes (patents pending) neatly protects them. And the design is such that only a 0.5-ml. sample volume is required.

Meter is scaled from 2 to 12 pH for easy reading, and a simple adjustment enables readings from 0 to 14. Accuracy to 0.1 pH is stated obtainable. Hearing-aid type batteries provide up to 1,300 hr. of operation. Electrometer tube, switch, and input connector are sealed in a single unit to assure freedom from high humidity difficulties.

The one-knob control and continuous reading features of this instrument are intended to simplify operation by untrained personnel. Grounded samples can be directly measured because of no external power connections. Instrument and electrode are completely shielded.—*Analytical Measurements Inc., 585 Main St., Chatham, N. Y.*

fmc Utility Fillers



An Innovation in Fast, Accurate Volumetric Filling

Inset view shows FMC "No-Can, No-Fill" mechanism, which prevents spilling and wasting product in the event no can is fed to the machine.

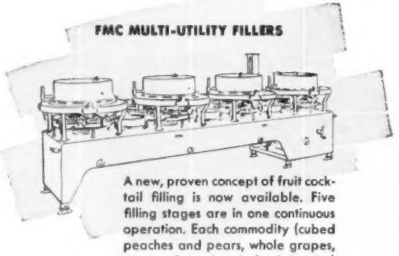
FMC Utility Fillers mechanize the filling of products previously requiring "hand pack" methods. For highest quality packs, plus substantial production savings, these fillers successfully handle sliced peaches, cherries, lima beans and countless other whole and granular products. Exclusive operating features include FMC "No-Can, No-Fill" mechanism eliminates waste by preventing discharge of fill when a can is not in the receiving position. Telescoping measuring pockets, adjustable while machine is operating, accurately and uniformly measure fill. A specially designed funnel device prevents spillage during transfer of products from measuring pocket to can. Each filled can travels over a vibrating track which properly settles entire contents without damage. The new Series 100 Utility Fillers provide smooth, economical filling performance on even the most hard-to-handle products.

Write for full information
or call your nearest FMC representative.

FMC SERIES 100 UTILITY FILLERS

Model	No. Feed Pockets	Can Sizes	Cans per Min.
101	11	Nos. 2½, 2, 303, or 1 Tall Std.	61 to 168
102	6	No. 10 and 46 oz., 404 x 615	30 to 75
103	15	Most sizes from No. 1 Tall to 8 oz.	100 to 250

FMC MULTI-UTILITY FILLERS



A new, proven concept of fruit cocktail filling is now available. Five filling stages are in one continuous operation. Each commodity (cubed peaches and pears, whole grapes, pineapple sections, halved cherries) is measured individually to adjustable, accurate proportions for single container discharge.

First in diversified Food Equipment

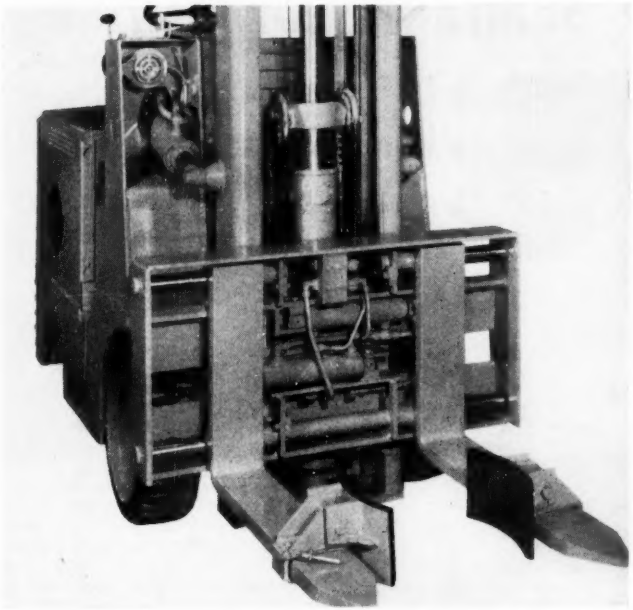
fmc FOOD MACHINERY AND CHEMICAL CORPORATION

FOOD MACHINERY AND CHEMICAL CORPORATION
Canning Machinery Divisions

General Sales Offices:

EASTERN: HOOPESTON, ILLINOIS **WESTERN:** SAN JOSE 6, CALIFORNIA

New Clamp Speeds Drum Handling

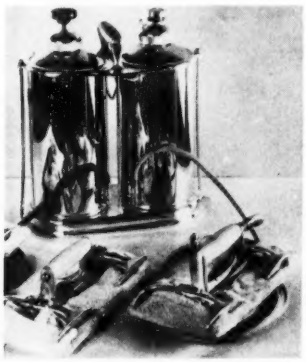


Cylindrical objects can be handled fast and easy, either individually or as unit loads on pallets, with use of a new drum clamp. Device picks up individual drums, barrels, or any other cylindrical material, and loads a pallet, which is then handled after two rubber-faced grab plates are removed from the forks.

Inside spacing is adjustable from 19 in. to 32 in. The two forks move simultaneously, either in or out, by means of separate hydraulic cylinders. Two shoes, which slip over and are pinned to standard pallet forks, hold curved rubber-faced plates in place.

Reducer valve positively controls gripping pressure and can be adjusted so that cardboard drums can be handled without crushing. An accumulator keeps hydraulic pressure constant for safety in moving the drums.—*The Baker Raulang Co.*, 1250 *W. 80th St., Cleveland* 2.

Mechanical Unit Washes All Interior Walls



Claims of cutting wall washing time and eliminating streaking, dripping and drop cloths are made for the Wallmaster. It is designed to wash, rinse, and dry all types of interior wall surfaces.

Lightweight trowels, covered with heavyweight terry cloth pads, apply cleaner to walls. This is done by finger-tip control from pressure tanks. Unit is entirely mechanical.

Rough, uneven wall surfaces may be cleaned with a new attachment called Handeasy. It consists of a valve constructed on a small aluminum plate which fits conveniently inside the palm. —*Quaker Maintenance Co. Inc.*, 124 *W. 18th St., New York City.*

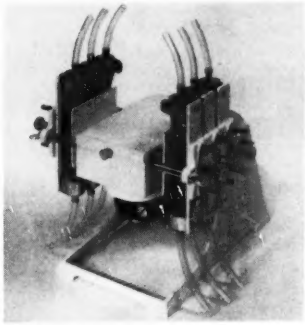
Heavy-Duty Caster Is Spark-Proof

To meet the handling problems encountered in explosion-hazard processing plants, heavy duty casters for pneumatic industrial wheels have been announced.

Fulfilling safety requirements, the new caster is spark-proof and stated to generate minimum friction heat due to rollability.

As a further safety factor, caster incorporates cased bearings that are said to eliminate the race wear common with ordinary ball bearings.

Currently available as a mounting for 10-in.-dia. pneumatic wheels, the caster has designed load rating of 1,200 lb.—*Aerol Co., Inc.*, 2820 *Ontario St., Burbank, Calif.*



Pump Proportions Six Liquids

This "6 in 1" Model No. 0 pump is a unit combination of six separate pumps operated by a common motor of 1/20th hp., 110v, single-phase.

Each separate pump has a capacity of from 1 cc. to 500 cc.'s per min. when the solution is water or a free flowing liquid. A total capacity of 3,000 cc.'s per min. can be obtained when all six pumps are hooked up to a common source of supply and a common outlet.

A regulated flow of from 1 cc. to 500 cc.'s per min. can be obtained from a single pump and a specific output of one and up to six separate liquids can be delivered simultaneously in desired proportion within the capacity of the unit.

Pump primarily designed for laboratory and pilot plant work is ideal for metering small quantities of liquids.—*Brosites Machine Co.*, 50 *Church St., New York City* 38.

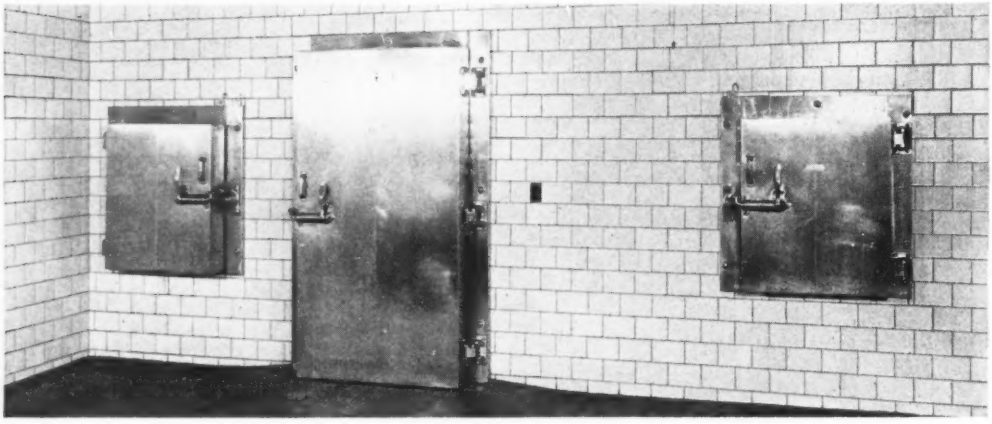
JAMISON Stainless Clad Doors

preferred for "SANITARY SHOWMANSHIP"

- FAR MORE SANITARY!
- EASIER TO KEEP CLEAN!
- MODERN DESIGN . . . GLISTENING BEAUTY!

IN THE STORE

Wendt Cream Top Dairy, Niagara Falls, uses the "Sanitary Showmanship" of Jamison Stainless Clad Doors both in the retail store and in the plant. Reach-in Door in the store leads to the sales Cooler.



JAMISON
HAGERSTOWN, MARYLAND, U. S. A.

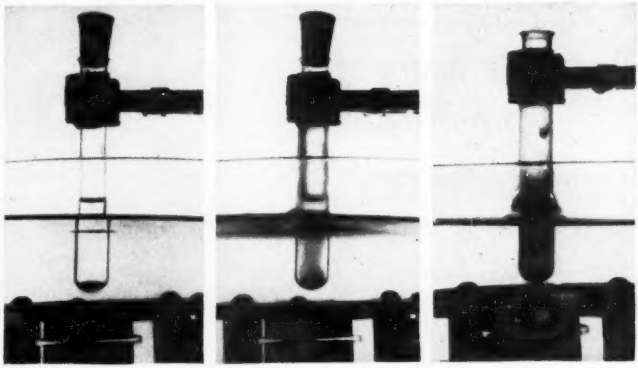
The leader for more than 50 years

IN THE PLANT

Stainless Clad, Super-Freezer Walk-in Door leads to the large Ice Cream Hardening Room. Super-Freezer Reach-in Doors, for speedy handling of cans and packages, are also of sanitary Stainless in keeping with the glistening, spotless, easy-to-clean tile walls. Sanitation and Cleanliness are by-words with all dairies . . . that's why they are buy-words with JAMISON.

For full information on the popular JAMISON line, write for Catalog 175. Jamison Cold Storage Door Co., Hagerstown, Md., U. S. A.

Scientists Probe Food-Field Ultrasonics



Research men are now closer to the use of ultrasonics in the food field for pasteurizing milk, sterilizing containers, special mixing or emulsifying, and many other operations, through findings now being made by Westinghouse scientists.

High frequency sound waves (waves beyond the range of hearing) have been found useful for mixing such naturally insoluble substances as oil and water, or mercury and water.

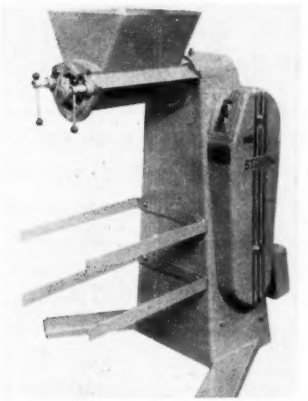
Scientists at the Westinghouse Research Laboratories are making a study of the fundamental properties of these waves. The generator is being demonstrated (left photo) by Dr. Patrick Conley, physicist at the laboratory, who heads up the unique research project.

The jar of oil atop the generator contains the heart of the device—a tiny quartz crystal. Application of an electronically generated, high electrical voltage across the crystal causes it to vibrate about 750 thousand times a second. These vibrations create ultrasonic waves which agitate the molecules in the liquid. If continued long enough, this brings complete mixing or emulsification. This action is illustrated in the series of three small photos on the right.

For these camera shots, the test tube was filled with water and mercury and immersed in the oil-filled jar a few inches from the crystal. In the first photo, the reaction has just got under way—the globule of mercury is visible in the bottom of the tube. As the impact of the sound waves takes effect, a cloud of minute particles of mercury forms in the water. Complete mixing or emulsification of the two liquids is seen achieved in the third photo. Internal pressure blew the cork.

To make these sound wave pictures, the room was darkened and light from a monochromatic source was beamed through the piece of ground glass held by Dr. Conley. Time exposures up to one minute were needed to register the waves on the film.—*Westinghouse Electric Corp., 306 Fourth Ave., Pittsburgh 30.*

Leakage Prevented In Oscillating Granulator



Welded stainless steel oscillating granulator is designed for nearly complete elimination of leakage of material. Part of the hopper that seats the screen provides a longer and more accurate seat to prevent material from working around the ends. Screws and clamps hold the screen tightly in position. Smooth inside finish of the hopper permits easy cleaning.

The entire drive mechanism is completely sealed in oil, stated to greatly extend the normal life of these parts. Motor of the granulator is protected against dust and dirt. It is mounted within the housing, with only the ends exposed for ventilation. Belt guard and starting switches are standard. Rotor and shaft are splined together rather than pinned.

All pockets and points where dust can collect have been eliminated. Hopper bottom is designed for airing the tight-fitting discharge chute of improved type with quick-acting toggle clamps.—*F. J. Stokes Machine Co., 5900 Tabor Rd., Philadelphia 20.*

Special Neoprene Coating for Maintenance Work

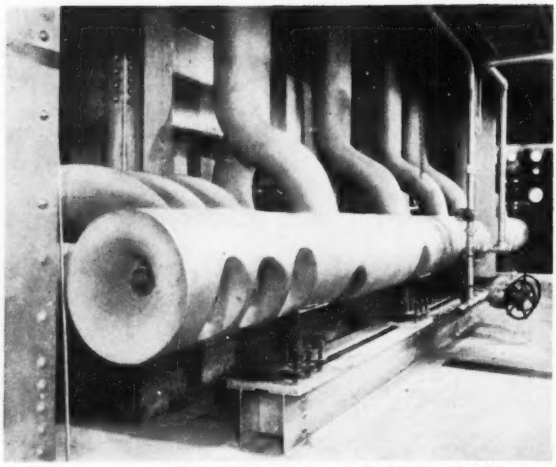
Industrial maintenance work on structural steel, concrete, wood and exterior surfaces of tanks and equipment can now be done with a new air-drying Neoprene-coating product.

It is applied by brush or spray gun in a single coat of 5-10 mils thickness. Outstanding properties are those which distinguish Neoprene—high resistance to oil, grease and chemicals, and also to age-cracking by sunlight, weather and ozone. The product in addition possesses the characteristics of any rubber product—resilience, elasticity, and the anti-abrasion and non-chipping properties.

The new material, named Gaco Neoprene Maintenance Coating, has the feature of developing its desirable physical properties without benefit of heat. A solvent solution of a specially developed Neoprene composition,

In every temperature range—

KEASBEY & MATTISON INSULATIONS DELIVER MORE HEAT AT LESS COST!



Boiler and furnace header in the Riverside Power Plant, Lake Charles, La., of the Gulf States Utilities Corporation, Beaumont, Texas. **Insulation Contractor:** Armstrong Cork Company.

Whatever your heat insulation problem, you'll find a Keasbey & Mattison covering that will solve it better. Consider the two K&M Insulations used in the above installation, for instance:

"FEATHERWEIGHT" 85% MAGNESIA

Keasbey&Mattison"Featherweight"85% Magnesia withstands temperatures up to 600° F. without loss of insulating value. It is structurally strong, yet exceptionally light in weight. Alternate heating and cooling, wetting and drying does not effect its insulating properties. Its thermal efficiency remains unaffected after years of service.

HY-TEMP COMBINATION

This efficient and practical insulation combines the high heat-resistant properties of Keasbey & Mattison Hy-Temp with the superior insulating qualities of "Featherweight" 85% Magnesia. This makes Hy-Temp Combination Insulation suitable for exacting temperature control up to 1900° F.

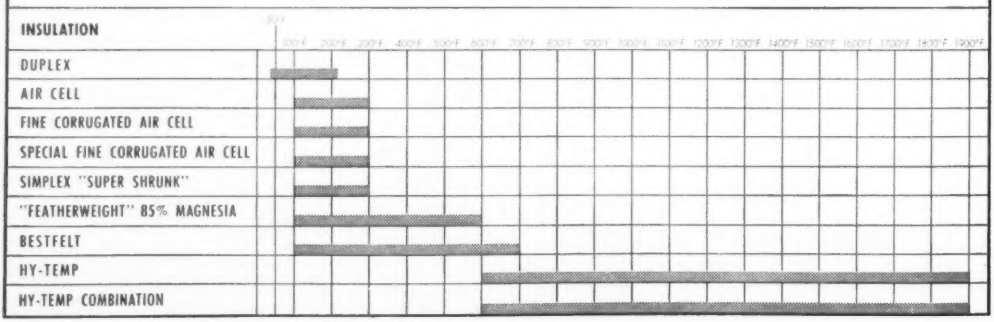
Your Keasbey & Mattison Distributor — who is an experienced applicator — will be glad to give you complete information on these or any K&M Insulations. Or, write us direct.

Nature made Asbestos . . .
Keasbey & Mattison has made it serve mankind since 1873

K&M best in asbestos

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

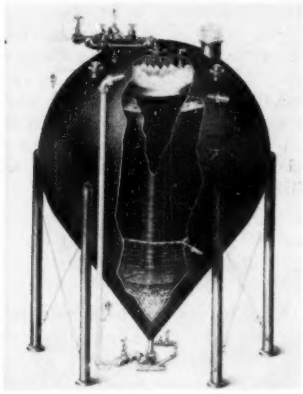
THERE'S A KEASBEY & MATTISON INSULATION FOR EVERY NEED



it will not gel or "set up" in the container, but will cure at normal temperatures after the solvent has evaporated.

Longer life expectancy of the new material is based on two properties—its chemical stability and inherent resilience. Chemical stability is particularly good against the destructive agents to which industrial coatings are exposed, notably attack by chemicals and oxidation by air and sunlight. And the coating's resilience is advantageous in that it removes the danger of cracking and peeling caused by vibration, distortion, or thermal expansion and contraction of the structure to which it is applied.

Surface preparation need not include sandblasting or use of a primer, according to tests conducted in which rusty steel was wire-brushed and wiped clean of grease and dirt, then given a single coat and tested for bond strength. After allowing a short interval for solvent evaporation and air-curing (2 to 7 days), bond strength was found to be entirely adequate for the coating's intended purpose.—*E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.*

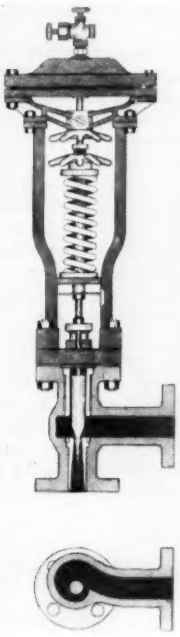


Sediment Tank Comprises Hemisphere Over Cone

A hemisphere mounted on top of a cone is the basis for a new design sedimentation tank for hot process water softeners. The inverted cone provides uniformly increasing area from tip to circular top, which is necessary for correct functioning of the tank. The hemisphere has a natural strength superiority over conventional cylindrical shapes.

Raw water, steam and chemical inlets, spray heater, deaerator and treated water collector are all mounted in the hemisphere, while the inverted cone contains the downtake, sludge bed, and rising zone of water being treated.

This exclusive combination is claimed to make most efficient use of materials and tank's space, while assuring uniform stress distribution because of elimination of knuckle radii. It meets the functional requirements for this type of sedimentation tank—low rising rates and largest possible settling area—and yet is not as heavily built as conventional cylindrical tanks—*Graver Water Conditioning Co., 216 W. 14 St., New York 11.*



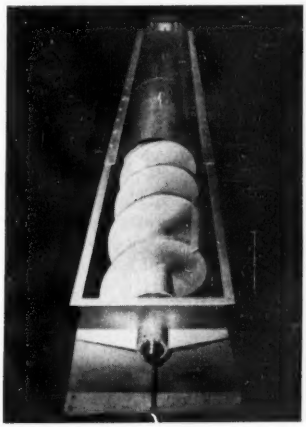
Flow Regulating Valves For Severe Service

Announced is a complete new line, flow regulating valves, designated as Type V10, are designed to handle steam and water at high pressure drops, and especially flashing condensate.

Uses include drainage for stage heaters, evaporator coils, flash tanks, process systems, subcooled heaters, boiler blowdown, feed pump recirculation, and other severe service conditions where high-velocity impingement has demanded frequent maintenance or complete valve replacement.

All internal parts of the valve, seat, disk and long guide sleeve, are made of stainless steel, with heat treating and grinding to precision fit. Valve design, with exclusive scroll inlet and gradually expanded straight outlet, eliminates direct impingement and resulting corrosion-erosion effects.

Valves are supplied in seven pipe sizes ranging from 1- to 4-in. All sizes can be furnished in 150 to 600 psi. standards.—*The Swartout Co., 1851 Euclid Avenue, Cleveland 12.*



Heat Exchanger Handles Batch or Continuous

Thermascrew is a continuous heat exchanger efficient for batch or continuous processing. It is a screw-type conveyor with hollow shaft and screw, and a jacketed trough.

A heating or cooling medium is circulated through the hollow portions while the material passes through, contacting both jacket and screw. As a batch heat exchanger, the unit functions like a jacketed kettle or ribbon mixer with a hollow single or twin screw rotor.

Design is for hard use, yet minimum maintenance, with extra heavy construction used throughout. Special construction gives maximum exposed surface while protecting weld against wear. Screw and trough stay bolted for pressure requirements. Standard construction is of carbon steel carrying up to 120 psi. on screw and 25 psi. on jacket.

Unit may be fitted for vacuum drying and evaporating or with supplementary air for drying, heating or cooling. Mixing ribbons and lifting flights are available when required.

There are seven standard sizes, offering 9 in. to 24 in. screw dia., 12 ft. to 20 ft. effective length, and ½ to 10 hp.—*Rietz Manufacturing Co., 441 Folsom St., San Francisco.*

In Behalf of Progress . . .

Make Yourself Heard in Washington Quickly

If they have not already done so, food processors and food equipment manufacturers better make themselves heard in Washington, and quickly. Otherwise their branch of the industry will not get enough new equipment to do the job government and consumers will demand of it. Some branches may be frozen in the status quo and have to hold their production lines together with haywire.

The needs of each branch of the industry should have been placed before its claimant agency in the Production & Marketing Administration of USDA before May 1. Then the agency could have given the data thorough consideration and used the facts as the basis for requesting an allocation under the coming Controlled Materials Plan. Certainly there should be no further delay, as indicated by the article, "Materials Picture Dims," elsewhere in this issue.

Associations or groups of equipment manufacturers which have not done this job should be prodded into doing it immediately. And where this cannot be done, the corresponding food processor association should go to bat.

Somebody better do something without further delay. The future of food processors is at stake.

A Controlled Materials Plan can be helpful or harmful to the food field. Much depends upon how big a slice of the available scarce materials is handed to each branch of our industry. And the size of the slice will depend to great extent upon the size of the requirements honestly presented in data from the claimant agency.

Early in April, food processors in various branches of the industry and different parts of the country reported increasing difficulty in getting new equipment. But this is nothing compared to what their plight will be under a CMP which does not provide for them.

On the other hand, many manufacturers would find it easier to get new equipment under a CMP which allocates to their branch a reasonable share of the materials pie—a share based upon demonstrated needs and established essentiality.

In the beginning, CMP will cover only steel, copper and aluminum. And it is designed to regulate the flow of these metals into three areas—direct defense, defense-supply activities and—expansion of capacity needed for the defense effort. So it is important that your branch of the industry be considered essential.

Food processors are too accustomed in the defense effort and in the civilian economy to keeping quiet in emergencies. They do not come out slugging when attacked nor wade in after their share when the government cuts a cake.

In times like these, it takes a fighter to get what he has coming to him. The more forceful and persistent your approach to Washington, the more likely you are to get special DO ratings before CMP and fair treatment under CMP.

Why Not Give F&DA Funds for Technical Studies?

Much benefit to the food processing industry might result if additional funds were given to the Food & Drug Administration for technical investigations. A great deal of the time-consuming and costly procedure of standards making and regulatory planning might be eliminated.

Suitable funds would make it possible for F&DA technical men to cooperate with technologists in the food industry and come up with fundamental facts pertaining to proposed standards or regulations. Then the hearings could be relatively brief and still accomplish their proper purpose. And the cost to food processors of keeping expensive technologists in Washington during prolonged hearings would be reduced appreciably.

Such a procedure on the part of F&DA now is impossible. It has too little money to carry out its regulatory function, and almost no funds for basic investigation.

We would like to suggest that a modest percentage increase, perhaps 10 percent, be granted in the appropriations for F&DA—with the provision that this money be used exclusively for technical investigations.

This would permit the Commissioner to have a few able men with travel funds and suitable technical assistants who could go into industry and conduct basic investigations. These men might later participate as specialists in standards proceedings. And they would be available as advisors to the food regulatory staff.

But they very definitely should be withheld from active seizure and prosecution cases. Their function instead would be to make fundamental investigations to the end to see that methods of testing, definitions of a technical nature, and factual bases for standards of identity and quality are developed and kept up to date. And this they would do by cooperating with men from the industries concerned, not by police service.

This is something which merits consideration by food processors as a means of speeding and simplifying standards procedures.

Squeezing Extra Profit

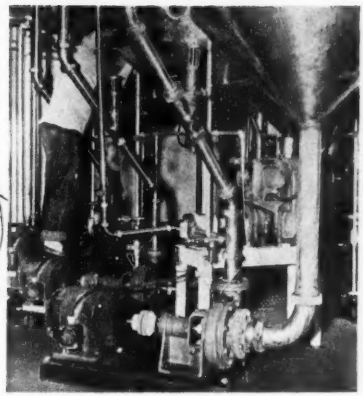
out of the orange concentrate business

It's a remarkable product—this orange concentrate . . . a boon to housewives, a welcome relief to household budgets, and a vast market for the enterprising producers.

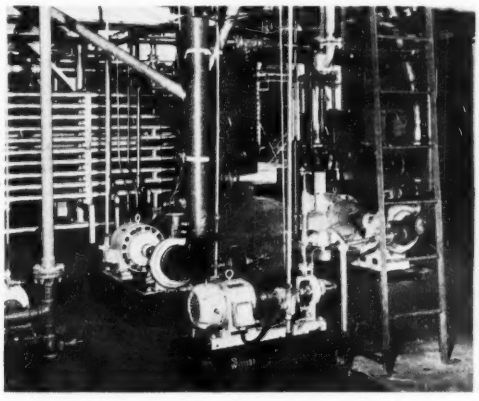
As might be expected, these producers have selected the most advanced equipment in order to produce at lowest costs—maximum profit. Included are Worthington Worthite Centrifugal Pumps with mechanical seals. Many installations in Florida and California are now in their third season, continually providing worthwhile savings through:

- Exceptional resistance to corrosion—no repairs or shutdown.
- Maintained high vacuum—no air in-leakage.
- Easy cleaning, without opening for steaming—by circulating the cleaning chemical through the evaporators.
- Low power consumption for circulating the heavy viscous concentrate.
- Quiet operation without cavitation with unusually low required NPSH.

First cost is low, too. Investigate Worthington Worthite Pumps for *any* acid or alkali applications—weak or strong. Worthington Worthite Pumps are built in standard sizes, from 1 to 20,000 gpm. For further proof that *there's more worth in Worthington*, call our nearest District Office or write to Worthington Pump and Machinery Corporation, Centrifugal Pump Division, Harrison, New Jersey.



FLORIDA CITRUS CANNERS COOPERATIVE (Lake Wales, Fla.) uses Worthington Worthite Pumps (mechanical-seal type) to circulate concentrate in a Mojonnier Bros. evaporator, 29.5" to 29.7" Hg vacuum, where fresh, depulped orange juice is concentrated at low temperature to ⅙ its original water volume. These pumps are now in their third season without repair.



MINUTE MAID CORP. (Plymouth, Fla.) installation uses Worthington Worthite Pumps (mechanical-seal type) on this Buflovak Evaporator. Large pumps in rear circulate the orange juice, small pump discharges concentrate through Rotameter from 29.5" Hg vacuum to holding tank under atmospheric pressure.

WORTHINGTON

C.I.3

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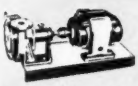
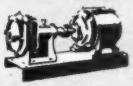
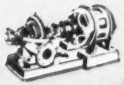


Types C G and C G L. Sizes ¾" to 10". Capacities to 5000 GPM; heads to 200 ft. Liquid ends of WORTHITE alloy.

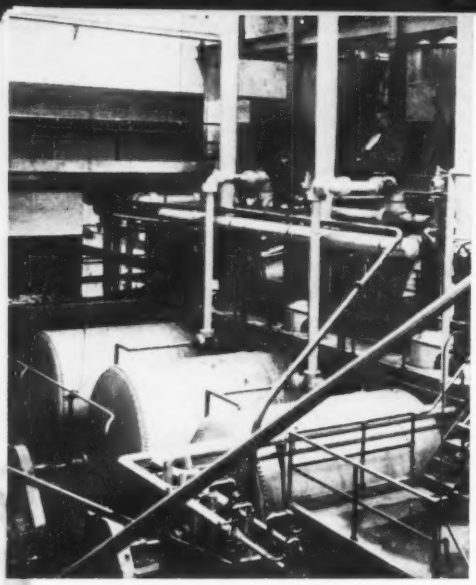


Type C F. Sizes 1" to 4". Capacities to 1000 GPM; heads to 130 ft. Standard, all iron and all bronze.

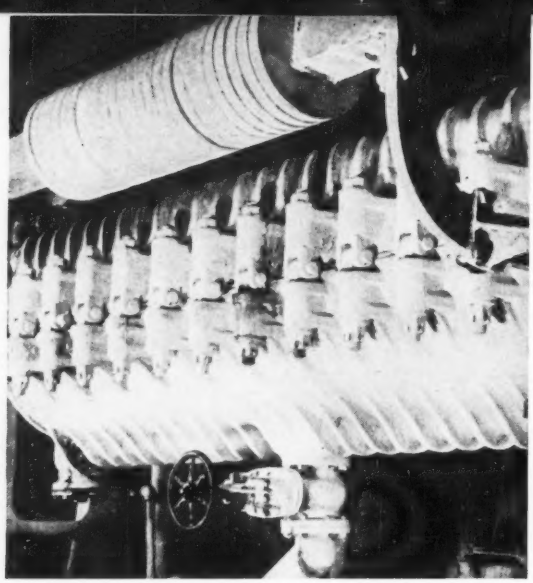
Type C Q. Sizes 1½" to 3". Capacities to 600 GPM; heads to 130 ft. at 1750 RPM. Closed impeller. WORTHITE shaft and fittings.



Type L. Sizes 3" to 8". Capacities to 2250 GPM; heads to 300 ft. Single stage volute. For general service.



1 **MOLASSES** is sterilized as it is pumped through tubular units (15 psi. steam pressure).



2 **SWEETLAND FILTERS** remove microorganisms and sludge thrown out of molasses during pretreatment and sterilization.

Unfold Here ⟶

How Bakers Yeast Is Made

Multi-Stage Operation Flowsheeted—From Laboratory Culture to Compressed Yeast

IMPORTED AND DOMESTIC cane and beet molasses are the basic raw materials used in the manufacture of bakers yeast. To obtain maximum growth, however, they must be supplemented with nitrogen-containing materials and phosphorus, and clarified to remove microorganisms and yeast growth inhibiting sludges.

First step in this process is pretreatment of a mixture of cane and beet molasses. This consists of adding corn steep liquor (optional as a nitrogen source), ammonium sulphate, a SO_2 removing agent (when required), an acid or alkali to adjust the pH to 4-5, and clarifying agents.

The mixture is then sterilized by heating to 250 F. in enclosed units—depicted at Point 1 in accompanying flowsheet—and clarified by filtration —Point 2. This latter operation may also be performed by centrifuging or settling.

Nutrients Added to Wort

The sterilized molasses is then diluted with water, fortified by addition of synthetic or inorganic nitrogen and phosphorus containing compounds and, when necessary, the pH is again adjusted to 4-5 with acids or alkalis. The wort is now ready to be used as a medium for growing yeast.

To attain the high degree of purity required in bakers yeasts, the cells are grown in successive stages of increasing sizes, starting in the laboratory test tube and ending in fermenters that are several stories high (Point 3). As the wort is transferred from tank to tank in the factory it is centrifuged to remove the spent wort (discharged to the sewer) from the yeast cream.

Vigorous aeration stimulates growth and reproduction. And the Zulauf technic (trickling molasses and nutrients into mashes at progressively increased rates) is applied to assure the correct amount of nutrients. Optimum growing temperature of 86 F. is maintained by circulating cooling water through coils in the fermenters.

At conclusion of the yeast propagation, the mash is rapidly chilled and centrifuged—Point 4. The heavy cream discharged from these machines is washed and centrifuged several times, then goes to filter presses—Point 5—where more water is removed, producing solid press cake.

Mixing and Packaging

From the filter presses the yeast cake is transported to mixers—Point 6—where it is thoroughly blended, then dropped into feed hoppers of units that extrude it in proper shape for cutting and wrapping—Point 7. Wrapped cakes are packed in master cartons.

When active dry yeast is the desired product, the press cake is immediately fed to an extruder that supplies finely divided yeast to a belt-type dryer. Dried yeast is then ground, sifted and packaged for shipment.

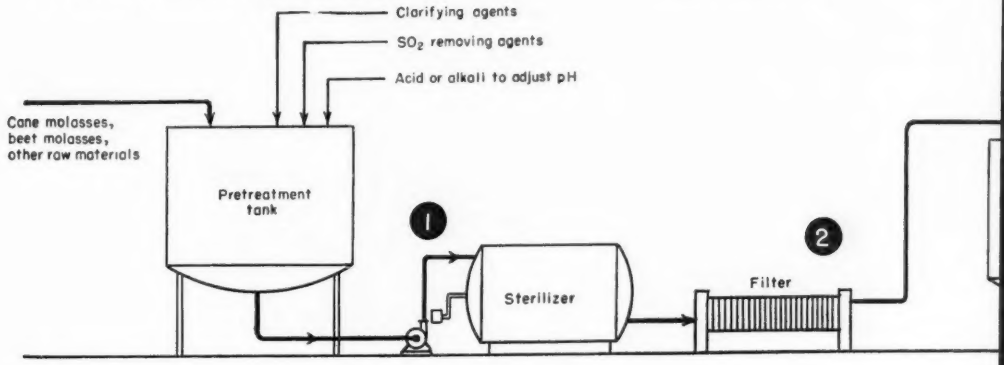
Report Rounds Out Story

For the full details of modern yeast technics—principles, methods, quality control, and engineering—see our Special Report, "Bakers Yeast — Unique Product" (p. 101-108 Feb. FI).

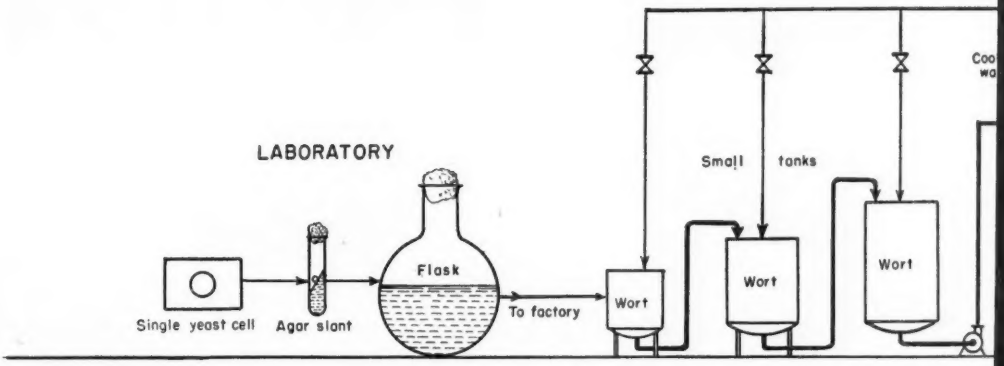
Acknowledgment for the accompanying flowsheet details is made to Frederic W. Nordsiek, Research Service Department, Standard Brands, Inc., New York City, who also authored our Special Report on yeast (Feb. FI). Photos used here are by courtesy of The Fleischmann Laboratories, of Standards Brands.

FE PICTURE—FLOWSHEET NO. 29

WORT PREPARATION

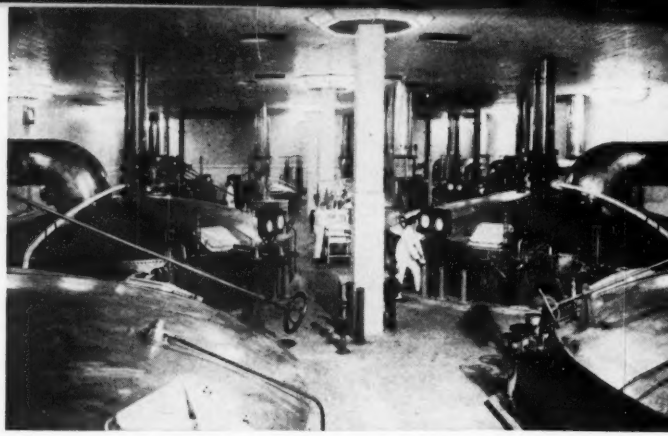


GROW

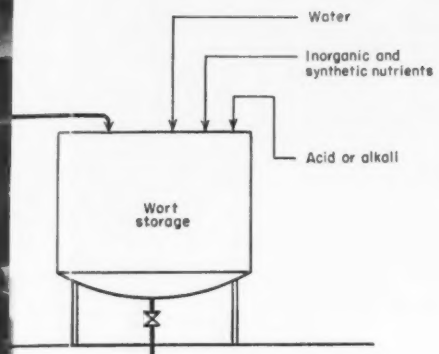


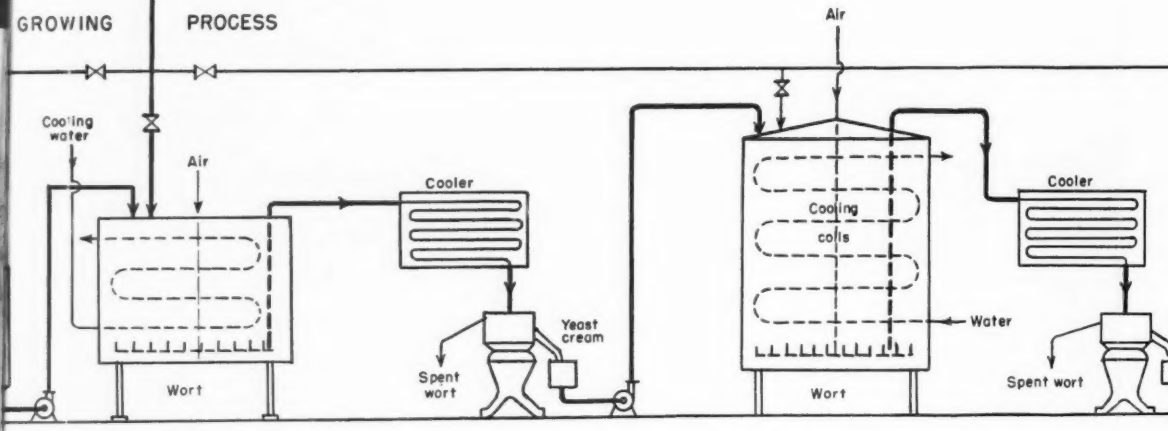
6 **MIXERS** employ helical ribbons rotating in opposite directions to blend press cake. They are turned on hinged side to dump yeast into extruder hoppers.

7 **EXTRUDING AND WRAPPING.** portions. It is then machine-wrap



3 **FERMENTERS** with capacities ranging up to 60,000 gal. are used. They are m
of copper and many are lined with resistant coatings to prevent metal contaminat



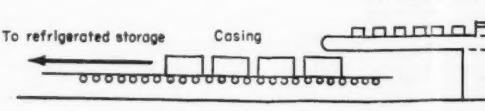


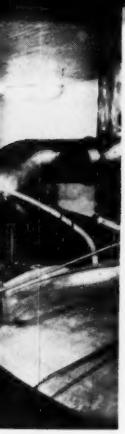
APPING. Blended yeast is extruded from square nozzles and cut into 1-lb.
ine-wrapped, packed into master cartons, and conveyed to refrigerated storage.

COMPRESSE

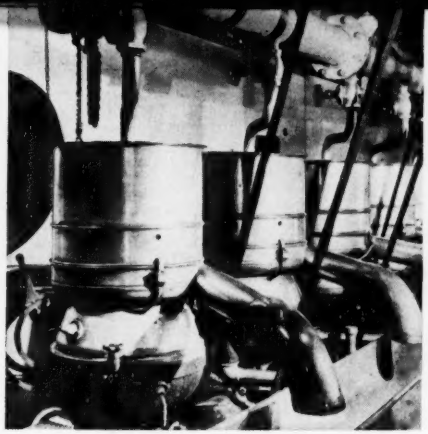
7

Cutting and wrap

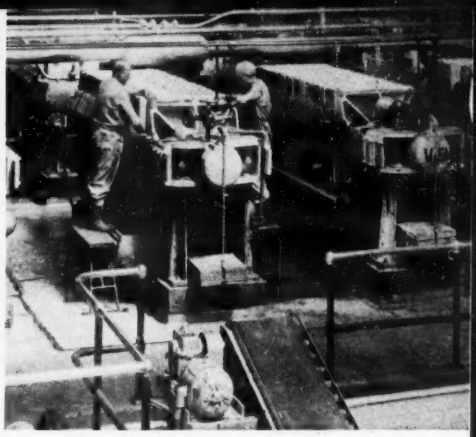




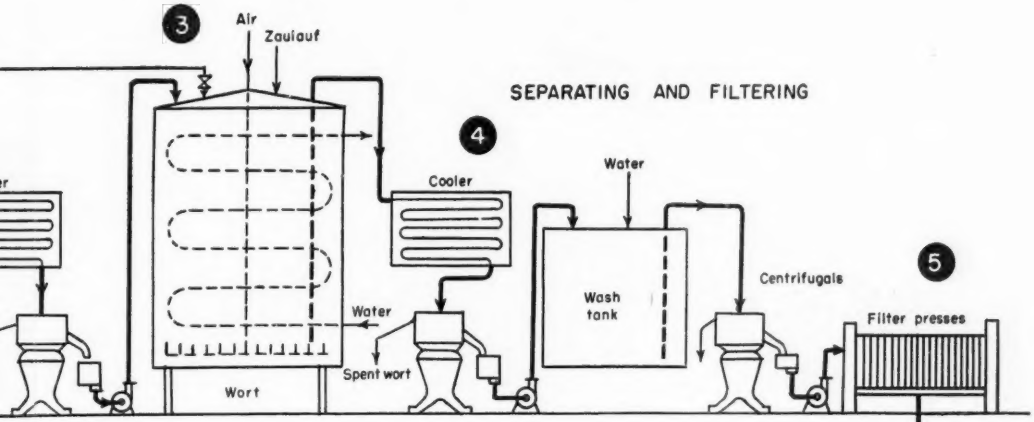
They are made
contamination.

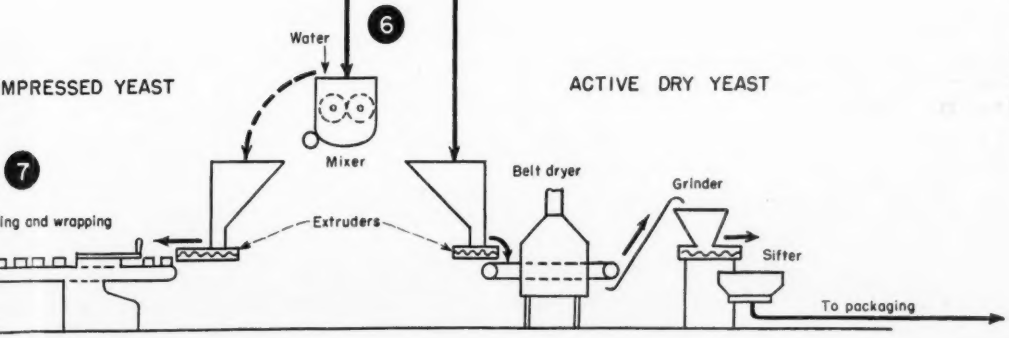


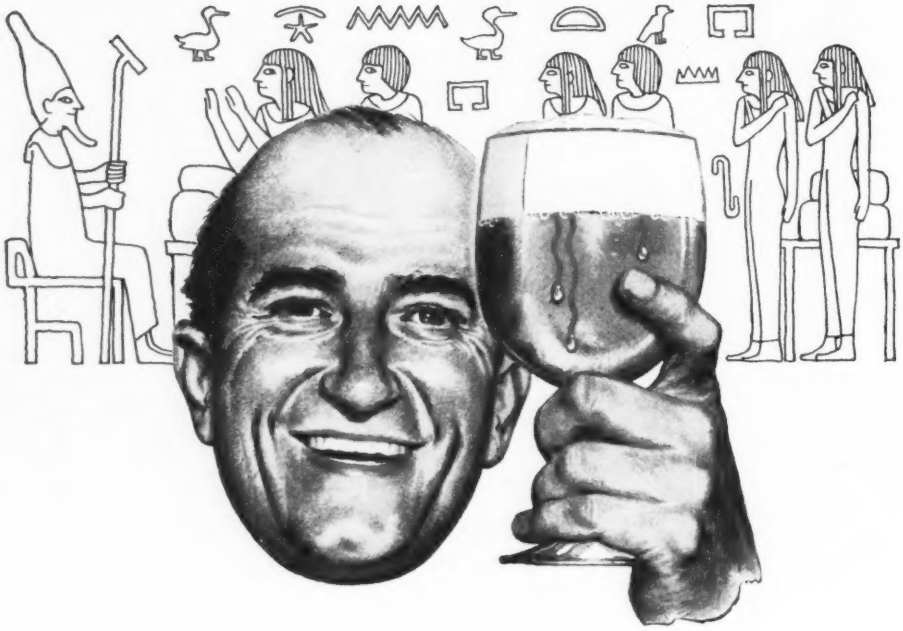
4 **SPECIAL** nozzle-discharge disk-centrifuges separate spent wort from yeast cream.



5 **FILTER PRESSES** receive washed yeast cream, remove more water, form press cake.







The Brewers uncovered a new wrinkle in an old, old science

THE ancient amber brew, you might call it. Brewing was a familiar art at least 5500 years ago by archeological record, and probably for many centuries before that.

In such a dynasty, the brewers naturally have run the gamut of materials for their equipment. Starting with the sun-baked clay of the ancients, ranging through wood and various metals, today the emphasis is increasingly on stainless steel in the never-ending search for higher quality and purity, finer taste and flavor, and lower overall costs. The bright, shining face of Allegheny Metal is to be found in equipment from one end of a modern brewery to the other, in the barrels on the trucks and in almost every tap-room.

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* * * * *

Complete technical and fabricating data—engineering help, too—are yours for the asking from Allegheny Ludlum, the nation's leading producer of stainless steel in all forms. Branch Offices are located in principal cities, coast to coast, and Warehouse Stocks of Allegheny Stainless Steel are carried by all Joseph T. Ryerson & Son, Inc. plants. ● Allegheny Ludlum Steel Corporation, Oliver Bldg, Pittsburgh 22, Pa.

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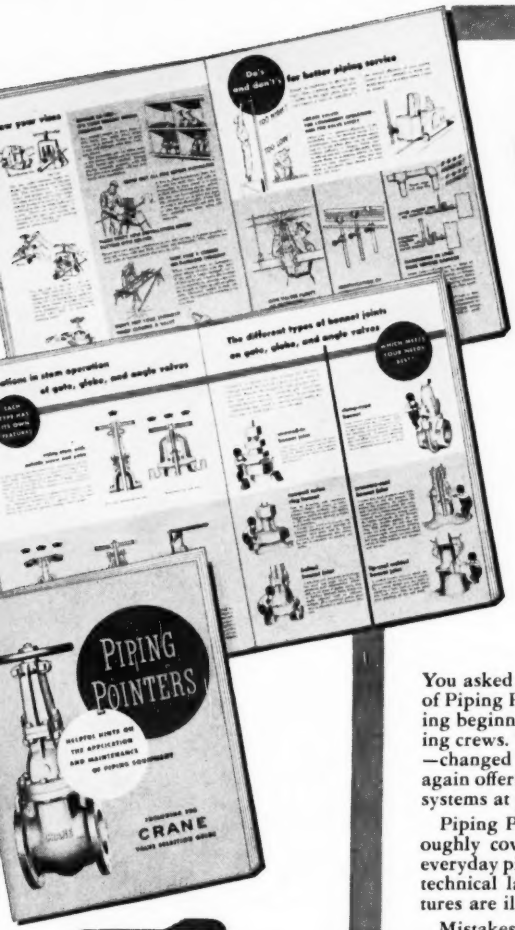
Do's and don't's for better piping service
The different types of bonnet joints on gate, globe, and angle valves
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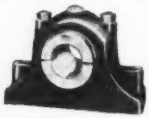

DODGE-TIMKEN PILLOW BLOCKS

ROLLING GRIP AND DIAMOND D CLUTCHES

SOLID STEEL CONVEYOR PULLEYS

We Must Pay As We Go

***We** must do our utmost to pay as we go for our present defense program.*

On that proposition those who speak with authority are remarkably well agreed. This editorial – the second in a series on our mobilization for freedom – sets forth in simple terms why there is this agreement.

Next year – the fiscal year beginning next July 1 – the federal government's budget calls for the expenditure of $10 billion more than is scheduled to be collected in taxes. The deficit is due to the increase in defense expenditures.

A part of this deficit can be eliminated by cutting non-essential expenditures and increasing efficiency in the defense program. There is wide agreement on this. It is the duty of the President and Congress to see that it is saved.

How the remaining deficit anticipated in the federal budget–$5 billion to $10 billion–is handled is crucial. The government can meet it by raising taxes–by paying as we go. Or it can borrow, issuing more government bonds.

Borrow Again?

We relied heavily on borrowing in both World War I and World War II. In World War I only about one-third of the expenditures of the federal government were met by taxation. In World War II about 45 percent were met in this way. The rest we borrowed. Some people ask, why can't we rely heavily on borrowing again? Why is it crucially important to avoid adding $5 billion to $10 billion to a federal debt that is already $257 billion?

Part of the answer is found in the contrast between this defense program and our all-out effort of World War II. Another part–and one that is all-important in combatting inflation–results from the rapid decline in the purchasing power of the American dollar in recent years.

We went "all out" in World War II. We put almost half of everything we produced into our military effort. Taxes high enough to pay the financial costs as incurred would have meant huge tax increases. It was feared that such increases would kill financial incentives to get "all out" production. Since we expected the war to be short, borrowing seemed a safe expedient. Price control and rationing, with wartime patriotism to give them effective support, were relied upon to keep in check the inflationary pressure created by borrowing rather than taxing.

Our present defense program is scheduled to take a much smaller share of our production, but to take it over a much longer period. At its peak, the program as now planned will take only about 20 percent of our total national production. But, to use General Bradley's phrase, "the conditions under which we labor may persist for ten, fifteen and twenty years."

What About Controls?

For a period of any such duration it would be foolhardy to expect that the sort of controls we had for the few years of World War II could hold in check the inflationary pressure created by not paying as we go. It would be as foolhardy as it would be for a family to plan on borrowing to pay the expenses of a member discovered to be afflicted by a chronic ailment which might last a long lifetime.

Obviously, the only safe thing to do in such a case would be to adjust the family budget so that the expenses of the illness would be paid currently.

Our heavy reliance on borrowing in World War II had consequences which block a successful repeat performance.

If the borrowing had been done by persuading individuals to transfer their savings into government bonds, relatively little inflationary pressure would have been created. What the government would have spent with the proceeds of such bond sales would have been subtracted from the money individual consumers could spend.

But most of the borrowing was done from banks. That course expanded the amount of money available to the government without any offsetting subtraction of money from the hands of individuals. Thus, when direct price controls were removed after the war, this bottled-up purchasing power contributed to a price inflation which has cut purchasing power of the American dollar about in half – and decidedly changed the attitudes of the American people toward that dollar.

During World War II, Americans in general believed that:

The war would not last long.

The dollar would hold its value, and even gain value after the war.

Many wonderful new products would be available in the postwar period.

Today the American people have:

Seen the value of their dollars melt away fast.

Been assured that, at best, we may have a 10-15-20-year pull ahead.

Been warned not to expect a postwar paradise anytime soon.

One result of these changed attitudes is a notable lack of enthusiasm for government bonds on the part of individual investors. This is indicated by the fact that since Korea redemptions of E bonds have exceeded sales by about $600 million. Another result is a continuing rush to convert dollars into physical goods and equipment or claims on them. This trend weighs against financing the prospective federal deficit by borrowing from individuals.

Borrowing from banks to meet the deficit would again add fuel to inflation.

The prospective deficit is due to federal expenditures for military goods. Even if they are not blown up or shipped abroad, these goods will not be available to civilians. But the money paid to those who produce military goods will still be available to bid up the prices of civilian goods. Thus, at a time when people show relatively little disposition to save dollars, a menacing inflationary pressure – an inflationary gap, the economists call it – will be created.

If our fight against inflation is to be successful this gap must be closed by taxes. We need to do other things, too, for inflation has many different causes. Credit expansion must be effectively controlled. Production of civilian goods must be increased as much as possible by eliminating waste and inefficiency. But a pay-as-we-go tax program is basic to a successful attack on inflation. And inflation – unless it is checked – could wreck our defense effort.

We cannot pay as we go merely by soaking harder the corporations and those in the upper income brackets.

As the President's Council of Economic Advisers has reported, "by far the largest part of the additional revenue must come from the middle and lower tax brackets. These are the brackets in which the great bulk of the income is located."

Taxes Can Attack Inflation

By spreading tax increases broadly, taking small amounts from many people, inflationary pressure would be effectively reduced. It is the expenditures of the great mass of people, rather than the small numbers in the upper income tax brackets, that create most of the pressure. Moreover, it is possible to increase taxes broadly without killing the economic incentives to produce. Maintaining these incentives is essential to the success of the defense effort.

Our elected representatives cannot be expected to be enthusiastic about a pay-as-we-go tax program. It involves increasing the taxes of the great body of their constituents, an operation completely lacking in political glamour. However, such a program also involves the integrity of the American dollar. And that is absolutely essential to the success of the defense program. We shall be very foolish if we do not let our leaders know that we want them to do everything possible to pay as we go.

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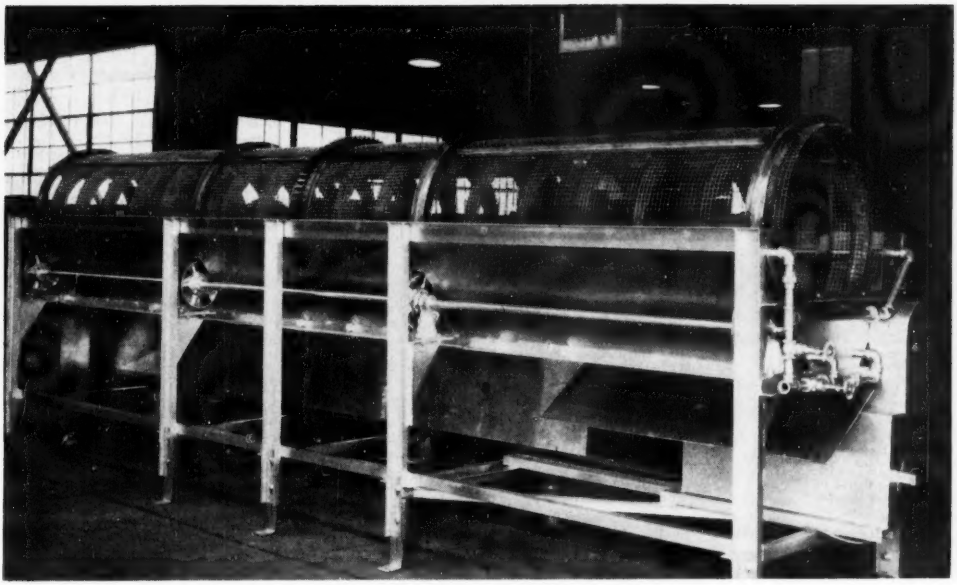


WHETHER it be a processing machine like this washer, the plant floor, or a steam line, the cost of upkeep can be cut by an effective maintenance program.

Making Most of Maintenance

Here are valuable pointers from Heinz on how to reduce the size of the maintenance item in the manufacturing budget

H. L. DUNKER
Manager of Engineering,
H. J. Heinz Co., Pittsburgh, Pa.

In time, all companies such as ours will have placed into operation some sort of budget control or standard cost program. And when this happens you will be amazed to see what a large part of the overall manufacturing budget is termed "maintenance and replacement."

Pays to Buy New Machine

To reduce the cost of maintenance, studies must be made to determine what machine or machines are wasting maintenance dollars. Then corrective action must be taken. To clarify this point I would like to use an example:

A certain machine in our operation has a first cost of about $6,500 when new, and it operates at 60 units per minute. This machine is costing about $3,000 a year—or almost 50 percent of its present-day first cost—in repair parts and maintenance labor each year.

Realizing that something must be done, investigations were conducted over a period of two years to find a machine that would do a quality job and yet be low in maintenance and operating costs. Many food processing machines are not standard, since they must perform special functions. And this machine was no exception.

We believe we have found the machine that meets the requirements. Although its first cost is $15,000, its production is 165 units per minute. And it has a high potential as far as average speed is concerned.

We estimate total maintenance on the $15,000 machine to be $200 a year, as compared to the $3,000 maintenance on the $6,500 machine.

Maintenance Divided Three Ways

The maintenance in food plants can be broken down into three parts: Utilities, buildings and grounds, and food processing equipment.

Under the item of utilities are such things as steam generators and auxiliary equipment, heating and ventilating units, steam mains, electrical feeders, transformers and fire protection equipment. You might ask the question: "What is the dividing line between utilities and processing equipment where, for example, a steam line is concerned?"

Our thinking is that the main distribution header through the factory is a part of the utilities, and where a branch comes off for a particular piece of equipment, that branch and all of its auxiliary valves and traps are maintained under the account of "food processing equipment."

Handling Utility Maintenance

An annual Utility Inspection Report is the basis of utilities maintenance. The accompanying inspection report of factory steam mains is typical. I have selected this particular one because it sets forth pertinent informa-

ANNUAL INSPECTION REPORT OF UTILITY EQUIPMENT

Inspection Data

Maintenance Cost Estimate and Progress Tabulation for 12 Months Ending 1951

Page No. 8 | Bldg. No. All | Bldg. Name—General Factory | Factory

Dept. No. 160 | Section No. 160:08 | Group—Factory Steam Mains & Low Pressure | Distribution 722-9-160-270

No.	Item	Items in Need of Repair By Inspection	Items in Need of Repair Additional by Forecast	Man Hrs.	Notes on Condition	"Estiment" Hrs.	Labor Rate	Labor Amount	Material Cost	L & M Total	Date 2B No. Issued	2B No.	Notes on Progress
1	Valves	2	10	60	Repack	60	$1.25	$75.00	$25.00	$100.00		Stock	
2	Hangers & Supports				Satisfactory								
3	Insulation	2	4	60	Repair	60	1.25	75.00	50.00	125.00		Stock	
4	Expansion Bends				Satisfactory								
5	Expansion Joints				Satisfactory								
6	Dirt Legs				Satisfactory								
7	Traps	2	14	60	Clean and adjust	60	1.25	75.00	.....	45.00			
8	Condensate Tanks				Satisfactory								
9	Flash Tanks				Satisfactory								
10	Atmospheric Relief Valves				Satisfactory								
11	Flow Meters, H.P.	1	2	16	Have adjusted	16	1.25	20.00	.....	20.00	11/16/50	237865	Request for service man
12	Condensate Pumps		5	64	Inspect and repair	64	1.25	80.00	.....	80.00			
13	Condensate Tanks				Satisfactory								
14	Float Switches				Satisfactory								
15	Motors				Satisfactory								
16	Starters				Satisfactory								
17	Flow Meters, L.P.				Satisfactory								
18	Steam Piping			32	Replace	32	1.25	40.00	50.00	90.00		Stock	
19	Return Piping			32	Replace	32	1.25	40.00	50.00	90.00		Stock	
20	Relief Valves				Satisfactory								
21	Painting			64		64	1.25	80.00	136.00	216.00	11/30/50	237906	Lusteral " B " enamel
22	Reducing Valves				Satisfactory								
23	Emergency Repairs												
						388		$485.00	$311.00	$796.00	Total		

Inspected by R. W. Rolf | Date 11/27/50 | Estimated by R. W. Rolf | Date 11/27/50

ANNUAL BUILDING INSPECTION REPORT

Factory | Date November 22, 1950

Building No. 2 and 3—Rig Room	Description of Conditions Found	Labor	Cost of Repairs Recommended Material	Overhead	Total
1. Foundations	Satisfactory.				
2. Exterior Walls	Monitor walls require minor repairs to siding.	$19.20	$5.00	$19.20	$43.40
3. Exterior Window Frames, Sash Doors, Etc.	Some sash badly rotted and must be replaced. Most of the sash require glazing. Wood work requires painting.	163.20	50.00	163.20	376.40
4. Interior Walls, Conditions of Plaster, Sheathing, Studs, Framing, Etc.	Wood work requires painting. Lobby requires painting.	144.00	25.00	144.00	313.00
5. Roof Deck, Roofing, Flashing, Penthouse, Etc.	Monitor roof over chili sauce rig requires strengthening to remove sag.	96.00	100.00	96.00	292.00
6. Columns, Girders, Beams and Joists	Satisfactory. Some painting required.	48.00	10.00	48.00	106.00
7. Floor Wearing Surfaces	Floors rough and uneven around equipment. Some spots in aisles require repairs, screw trough requires painting. Lobby floor requires painting.	115.20	20.00	115.20	250.40
8. Exterior Platforms, Walks, Driveways, Fences and Grounds	Satisfactory.				
9. Miscellaneous	Building Nos. 2 and 3—Floor capacity, 1000-lb. live load.				
	Monitor roof bond expires February 28, 1963. Bond expired on remaining portion of roof.				
	Total.....	$585.60	$210.00	$585.60	$1,381.20

ANNUAL INSPECTION REPORT OF PROCESS EQUIPMENT

Inspection Data

Maintenance Cost Estimate and Progress Tabulation for 12 Months Ending 1951

Page No. 1 | Bldg. No. 1 | Bldg. Name—Rig Room | Factory

Dept. No. 680 | Section No. 680:02 | Group—McNitt Scalders | Distribution 717-9-680-270

No.	Item	Items in Need of Repair By Inspection	Items in Need of Repair Additional by Forecast	Man Hrs.	Notes on Condition	"Estiment" Hrs.	Labor Rate	Labor Amount	Material Cost	L & M Total	Date 2B No. Issued	2B No.	Notes on Progress
1	Chains	40 ft.		3	No. 3, 5 & 7 scalders need new chain	3	$1.40	$4.20	$40.00	$44.20	12/15/50	234762	
2	Sprockets	6		16	(See reverse side)	16	1.40	22.40	38.00	60.40	12/15/50	234762	
3	Steam Piping			32	(See reverse side)	32	1.40	44.80	24.00	68.80	12/15/50		Stock item
4	Gaskets			40	(See reverse side)	40	1.40	56.00	(On Hand)	56.00	12/15/50		On hand
5	Valves	40		20	Repack and check disc of each valve	20	1.40	28.00	4.00	32.00	12/15/50		Stock item
6	Diaphram Valves	14		24	Clean, oil and adjust each valve	24	1.40	33.60	0.00	33.60	12/15/50	234790	
7	Taylor Recording Controllers	14		60	(See reverse side)	60	1.40	84.00	890.00	974.00	12/15/50	234795	Return to factory
8	Motors	14		6	Oiled	6	1.40	8.40	0.00	8.40	12/15/50		
9	Wiring	14		8	All motor leads checked and painted	8	1.40	11.20	2.00	13.20			Stock item
10	Augers				Satisfactory								
11	Packing Glands	14		16	Clean out & repack all glands	16	1.40	22.40	30.00	52.40			Local purchase
12	Shafts			8	See note above. These are effected	8	1.40	11.20	10.00	21.20			Local purchase
13	Bearings		2		Satisfactory. 2 needed in stock of each kind				20.00	20.00	12/17/50	234800	
14	Chopping Block	3		16	(See reverse side)	16	1.40	22.40	48.00	70.40			Local purchase
15	Knives	14		8	All units have some that need to be straightened	8	1.40	11.20	0.00	11.20			
						257		$359.80	$1,106.00	$1,465.80	Total		

Inspected by C. H. Brooks | Date 11/21/50 | Estimated by C. H. Brooks | Date 11/28/50

tion relative to an otherwise complicated problem.

Building Maintenance Pointers

With regard to building maintenance, two fundamental policies will pay off in low maintenance:

1. Give careful consideration to the materials from which structures are made and how these are incorporated into the design. This is particularly true of floors, walls and structural supports.

2. Institute a periodic, thorough examination of all parts of the structure, and write a report on its conditions. Then deterioration of the parts may be checked before it progresses to the point where replacement is necessary, at considerable expense.

Proper selection of floors for the job they are to do is of prime importance, particularly in food plant "kitchens" and in filling departments. Here long life and sanitary conditions are desirable.

To determine whether building maintenance dollars are being properly spent, an accounting of the maintenance hours should be made from the Building Inspection Report, a sample one being presented herewith. Estimates can be prepared of the necessary dollars required. We keep records on individual buildings and compare them from year to year. This gives us a very good guide for future planning.

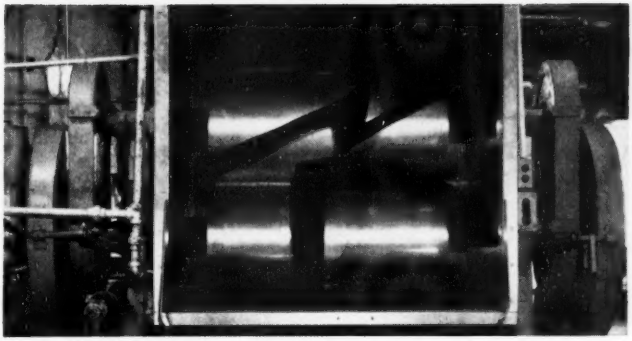
Processing Equipment Upkeep

Now we come to the third phase of food plant maintenance, which deals with processing equipment. This can be divided into (1) preventive maintenance and (2) corrective maintenance. The better the job done on the former, the less there is to be done on the latter, with a resultant decrease in production "down time".

While unforseen breakdowns will occur, they can to a large degree be anticipated, and repair parts kept in stock to minimize "out of service" time.

The operating personnel can be of great value to the maintenance department by being trained to report, at once, any minor fault that may develop in a machine. In the hands of a good production maintenance man, such information can prevent complete breakdowns.

The type of metal to be used in the manufacture of equipment is very important in respect to maintenance costs, particularly where there is any contact with food products. We receive pumps and other equipment in which there are such metals as copper, lead and zinc in larger quantities than are acceptable. This despite purchase order specifications calling for stainless steel of certain specifications.



IF LOW MAINTENANCE costs are to be achieved, particular attention must be paid to metals used in process equipment, such as this mixer. Otherwise, corrosion will take a big toll.

In the making of liquors for pickle operations, various combinations of vinegar, salt, and sugar are very corrosive. For example: We found perforations in a piece of 304 stainless steel tubing after ten weeks. The most trouble occurred in horizontal runs where air became entrained above the liquor line in the tubing. We call this "air line corrosion." We are giving consideration today to glass pipe and rubber-lined pipe for applications of this type.

A few years ago we made quite an extensive study of various types of stainless steels from a standpoint of corrosion resistance on various types of liquors containing acetic acid. The following conclusions were reached:

1. If a piece of equipment was so constructed that it could not be cleaned daily, then Type 316 or 317 stainless steels were preferred over 304 stainless.

2. If a piece of equipment could be cleaned and brushed properly every day to prevent pitting, then Type 304 stainless steels were just as resistant as the 316 and 317 containing molybdenum.

Determine Maintenance Cycles

The factory engineer and his department heads must determine the maintenance cycle or complete overhaul of the various machines. Much depends on the speeds at which a piece of equipment operates. Card indexes and references should be kept on machines to determine when they were last repaired, how many hours they have operated since the last overhaul, and how many repair parts were necessary for subsequent repairs.

One must be very careful in analyzing the breaking point between general overhauling and complete replacement. For example: A vegetable dicing machine may be almost as good as new if we completely overhaul it, but if it is overhauled we may have spent more money than a new one would cost, and we would not have incorporated in it any of the latest improvements in dicers.

Annual Repair Budget

The maintenance and replacement budget for process equipment is prepared on a yearly basis by varieties. Example: A tomato producing factory in Ohio would submit an Appropriation Request for its lay-away and preparation requirements for all of the tomato processing equipment. This would include motors, controls, wiring, steam and water piping, which are not a part of the utility program. For an example of how this can be built up in a department, see the accompanying Annual Inspection Report of Process Equipment.

Other Maintenance Factors

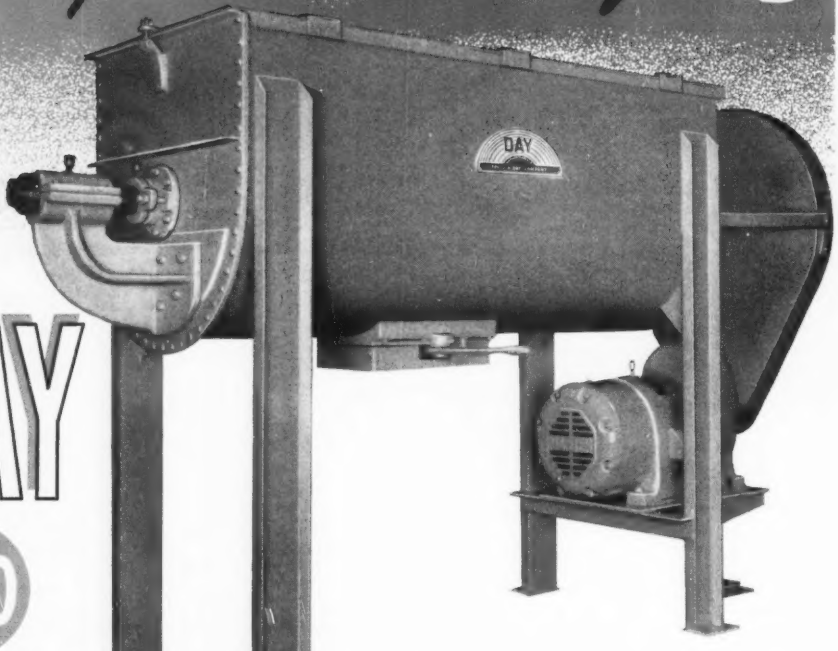
Machine contours in contact with the product must preclude pockets or ledges. Product lines must be installed and maintained according to prescribed standards, and housekeeping must be of the highest standard. This can be accomplished by training, by literature, and by the example that operating management sets.

A well-operated stock room is essential to an efficient maintenance program. A complete record of stock parts on hand must be kept, and a daily record of parts received and given out should be kept for entry in the stock record.

Two very essential ingredients in the maintenance of any plant are men and tools. Maintenance men who are alert, interested and have the know-how are the envy of any plant manager. But without the correct tools to do the job, the company's dollar will be spent uneconomically.

This article is based on a paper presented at the recent Plant Maintenance Conference in Cleveland.

Blending Powders Pastes & Liquids?



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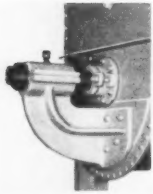
D-10

HEAVY-DUTY BLENDERS

do a finer, faster job!

DRY COLOR AGITATOR

for heavy bodied powders. Also available with Spiral Ribbon Agitator for paste, semi-paste, granular or liquid products.



OUTBOARD BEARINGS

provide extra shaft support, relieve stuffing boxes of bearing loads.

Whether you work with powders, pastes or liquids, you can depend on a DAY D-10 HEAVY DUTY BLENDER to give your production line a lift.

Scientifically designed agitators insure constant, thorough blending action. Sturdy outboard bearings provide ample support for the agitator shaft, remain free from abrasive action by the material being mixed and also eliminate bearing loads on the stuffing boxes. Dependable design includes a rigid frame, free from vibration, plain or stainless steel clad tank, and a geared head motor with silent chain drive. Discharge at center or either end is optional.

Call your J. H. Day Sales Engineer or write direct for details.

The J. H. Day Co., Inc., 1146 Harrison Ave., Cincinnati 22, Ohio

DAY

THE J. H. DAY COMPANY, CINCINNATI 22, OHIO

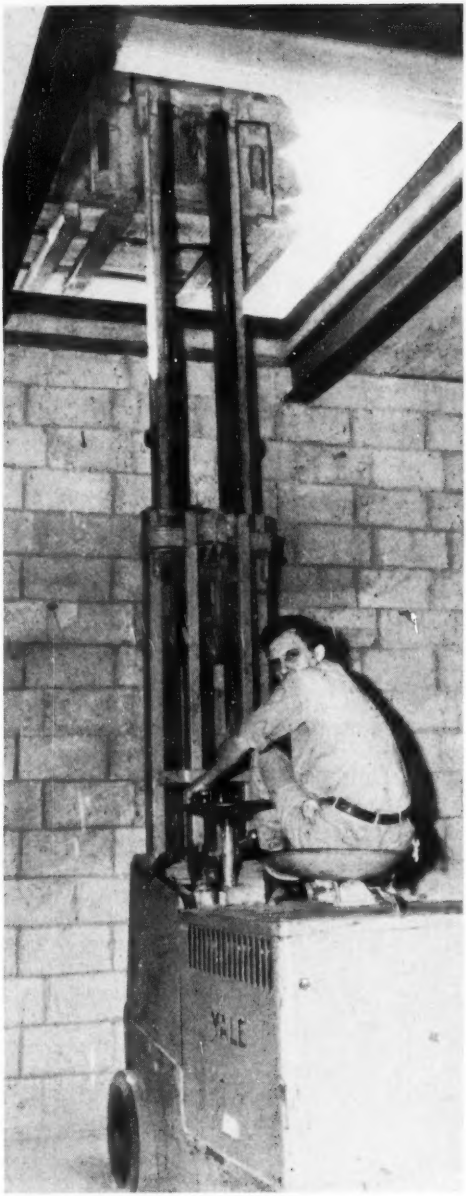
INCORPORATED

Unloaded, palleted →

INCOMING potatoes from trucks are manually stacked on pallets on receiving dock. Note truck boom in opening.

RIGHT: FORK LIFT, stationed in basement, lowers loaded pallet. While moving one to storage, next pallet is loaded.

and down ↓



"Fenced-In" Lift Truck Does Big Job

Confined to working in basement, unit acts as both vertical and horizontal mover for potatoes. . . . Also doubled for strongarm crew when plant was set up

IVAN C. MILLER
Editorial Consultant, "Food Engineering"

Adoption of unit-load fork-lift truck operations in the handling of potatoes has proved highly efficient and profitable in the new plant of Crouthammel Potato Chip Co., Quaker Town, Pa.

Originally, the company's lift truck was used to transport drums of cooking oil from the loading dock to storage and from storage to the processing lines. But after operations started in the new plant, steel tanks were installed for storage of cooking oil coming in via tank truck.

It was then that the truck, no longer needed for transporting oil drums, was put to its most profitable use—transporting palletized loads of potatoes from the receiving platform to conditioning storage and from storage to the elevated platform for feeding the peeler-washer. These operations are carried on in the basement of the building.

Automotive trucks loaded with bags of potatoes, transported from storage warehouses or farms, back up to the loading platform. Steel plates covering the two openings in the receiving platform are removed, and the fork truck then lifts a stack of pallets from the basement to the platform alongside the openings. Truck drivers and helpers then load the sacks of potatoes on the first pallet, and while the initial load is being lowered to the basement and trucked to storage, the next pallet is being loaded. (*Turn page*)

An outstanding fresh butter flavor in three superior types

All three variations of this remarkable imitation flavor are stable to heat and have unusually long shelf life.

Two are designed for use in confectionery and in baking, one being soluble in fatty compounds, the other soluble in water. The former has also been most effective in margarine. The third type contains no diacetyl.

The three constitute an unparalleled triangle of powerful butter flavor materials.

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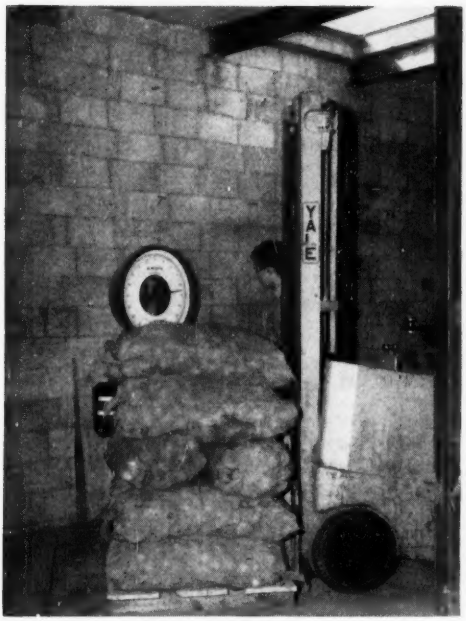
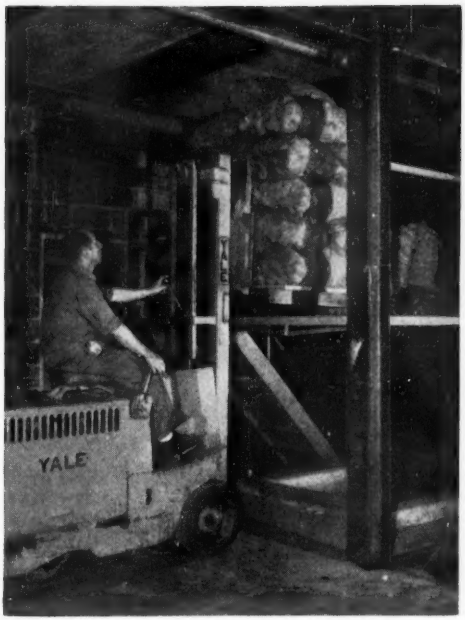
Potatoes are weighed



ENROUTE from dock (above opening upper right) to storage, potatoes are weighed. Scale dial is visible from dock.

. . . and moved



STORED potatoes are moved on pallets to platform from which they are fed to peeler-washer, also in basement.

The scale platform in the basement on which the potatoes are weighed is positioned at an angle from the wall. This makes it easy to place the load on the scale platform, whether received from the platform opening on one side of the scale or the other, and at the same time avoiding steel column supports.

Face of the scale and dial are parallel to the wall. The weight can be read from above either opening in the receiving platform. Weight of each pallet is marked on its side for rapidly determining tare.

Before the present system was in use, plant personnel had to hand truck bags of potatoes to storage after the bags were unloaded from the truck.

There is no outside entrance to the basement of the plant other than the openings in the receiving platform. The heavy fork truck was initially brought in by lowering by chain hoist through one of the openings.

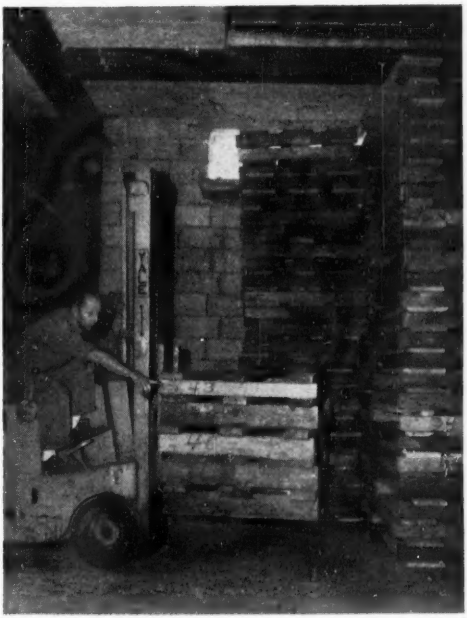
Despite confining of the truck to two operations—lowering palletized loads of potatoes in bags from the receiving platform and transporting them to storage, and moving them from storage to the elevating platform by which they are fed to the peeler—the company reports that these uses, alone, more than pay for the truck.

Contribution In Moving

However, the truck also proved a highly versatile unit when the company moved into its new plant. Use of the truck made it unnecessary to hire a crew to install machinery and equipment. And no riggers were needed to erect the steel stack in the boiler room. The truck replaced chain hoists and booms, crowbars and strongarm crews.

Sections of the smoke stack were joined from the top section down. As each section was attached, the joined sections were lifted by the truck and the next lower section added, until the completed stack could be lowered into place.

Pallets "go back for more"



EMPTY pallets are lifted to dock. Weight is marked on each for quick tare determination when loaded.

MACK TRUCKS

Get Things Done!

● Extra effort — that's the order of the day as American industry swings into high gear to meet the growing demands of the nation's expanding defense program.

Nowhere is this more important than in vital truck transportation — the mobile assembly line that keeps raw materials flowing to plants and factories . . . speeds the products of America's farms and industries to consumers and the armed forces.

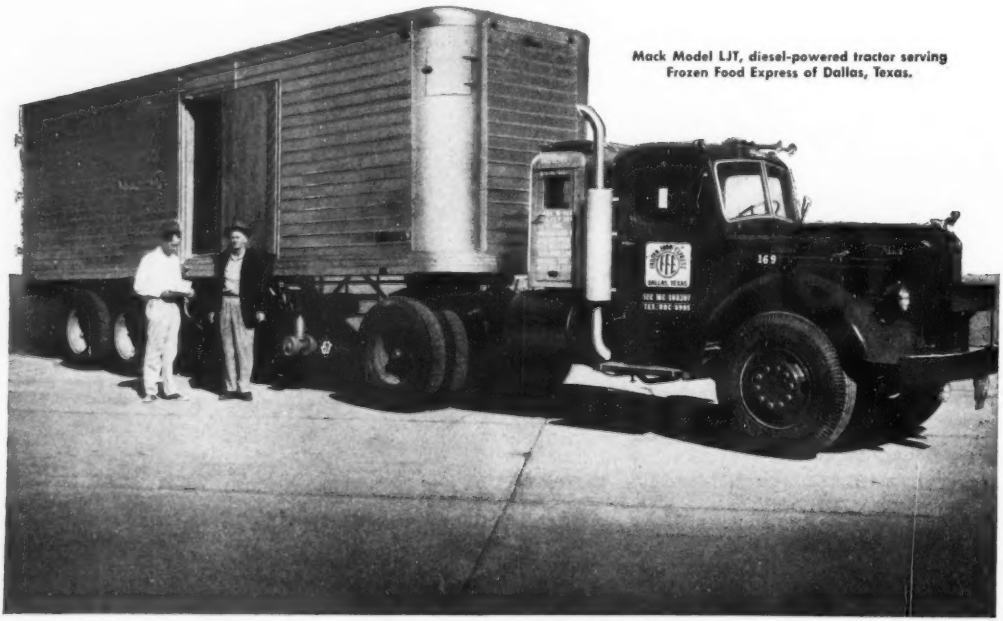
Here's work that's cut out for Mack trucks . . . jobs where sturdy Macks show at their best in *extra* strength and stamina, *extra* performance and *extra* dependability.

Your nearest Mack branch or distributor will show you how Mack's exclusive design and construction can cut *truck absenteeism* on your particular job . . . *get things done* faster, more dependably and with lower cost. You'll find it's a story well worth hearing.

Mack TRUCKS

. . . outlast them all

Mack Trucks, Empire State Bldg., New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.



Mack Model LJT, diesel-powered tractor serving Frozen Food Express of Dallas, Texas.

MATERIALS PICTURE DIMS

DO ratings won't get many essential equipment items in reasonable time. Some branches of food industry may face critical situation under the CMP. Immediate action by associations of equipment manufacturers is necessary

CIVILIAN PRODUCTION cannot long continue at the present rate. Basic materials are restricted to 20 to 95 percent of 1950 usage (see table), while industry has been plunging ahead at the rate of 120 percent of 1950.

In spite of sympathetic assistance from the National Production Authority, many very essential items of processing equipment cannot be obtained within reasonable periods with DO ratings. Even a Directive, a sacred tool to be used very sparingly even for defense agencies, cannot loosen a certain type of steel where it does not exist.

Changes in such figures as presented in the table occur overnight. Within two days after the table was first prepared, there were ten changes in availability of basic materials, all of them downward. Five items have been withdrawn from free distribution and have been put on allocation to essential users. This list will get longer.

By July 1, 1951, when a Controlled Materials Plan is expected to go into effect, probably more than 50 percent of all basic materials will have been allocated to defense production and to the most essential civilian industries. Then the scramble among the less essential industries really will begin in earnest.

Industry and DO Ratings

Defense Order ratings are intended to set up a system whereby defense agencies will get equable treatment in procuring their material and facility requirements. And a relatively small percentage of available materials was reserved for DO customers. Only in the case of full-alloy stainless steel, aluminum and cotton duck have the percentages available for civilian requirements been less than 50 percent of supplies.

But our expanding economy and hoarding and black-market operations have caused the withdrawal of ever larger quantities of the civilian share. As a result, the load of industry hardship applications which confronts NPA becomes greater and greater.

Issuance of DO ratings to relieve hardship takes the materials and facilities involved out of the reserve set up for defense agencies. This causes constant revision of the regulations to increase the reserve.

When MRO was added with a DO rating, a percentage increase was requested to take care of it. Within two weeks, however, the DO-97 orders applied for under MRO had exceeded expectations manyfold.

The result was inevitable. DO ratings are no longer any assurance that the holder can obtain his supplies. And a directive cannot be used except in very grave circumstances because it means asking all previous DO rating holders to step aside to let the more

(*Turn to page* 173)

Materials and Equipment Shortages as of April 5, 1951.

Item	M Order	Use Limitations (Base, 1950)	Percentage To Civilians
Carbon steel	1	None	70-95%
Stainless steels	1	None	50-80%
Full-alloy steels	1	None	40-95%
Rubber, total	2	90%	Restricted by items only
Rubber, dry natural	2	48%	Restricted by items only
Rubber, natural latex	2	100%	Restricted by items only
Rubber, camelback	2	150%	Restricted by items only
Rubber new synthetic	2	95%	Restricted by items only
Aluminum	5, 7	65% (prohibited uses)	40-55% On allocation by NPA after May 1, 1951
Tin	8	90-95%	75-95% (permitted uses only)
Copper and copper base alloys	11, 12	75-100%	90%
Rayon	13		
Nickel	14	65%	80-85%
Zinc	9, 15	80%	50-85%
Components or parts	17		
Pig and hog bristles	18	Restrictions on sales	
Cadmium	19	0-95 percent	
Iron and steel scrap	20	60-day work supply	Allocations by NPA
Aluminum scrap	22	Minimum carload or 60-day delivery	
Carded cotton sales yarn	23		70-80%
Tin plate and terne plate	24	Permitted uses only	
Cans	25	90-100% (percent permitted uses only)	
Tin-plate closures	26	As to weight of coating only	
Collapsible tubes	27	As to weight of tin and permitted use only	
Leather	28		75-90%
Horsehides and deerskins	29	Restricted to Military purposes	
Tungsten	30	On allocation by NPA	
Chlorine	31		90%
Ethylcellulose	32	60%	
DDT	32	80%	
Sole leather	34	Narrowed to military requirements	
Cattlehides, calfskins & kips	35	On allocation by NPA	
Government paper	36		75-95%
Zinc scrap	37	60-day supply	
Lead	38	30-day supply, 100%	80%
Antimony	39	60-day supply	
Metal working machines	40, 41	Stock pile or pool by GSA	30% maximum for each size
Wire insect screen	42	NPA encouraging maximum production	
Construction machinery	43	NPA encouraging maximum production	
Power equipment	44	Planned production program for machinery over $5000	
Chemicals	45	Critical list under allocation NPA	
Petroleum and gas industries	46	NPA assistance available in obtaining scarce materials	
Use of iron and steel	47	80%	
Bismuth	48	Limited to permitted uses	
Columbium & tantalum	49	On allocation by NPA	
Electric utilities	50	Self rating DO-48 (same as MRO quota)	Aluminum 49,000,000 lb. allocated
Glass containers	51	Restricted designs only	
Cotton duck	53		20%
Farm equipment	55	Self rating DO-87, expired May 31, 1951, restricted to items scheduled	

Stainless requires careful selection, too!

Before you marry your product to stainless steel, make certain that you've chosen the right analysis. *Stainless* is a broad term applied to a whole host of steels, each with its own characteristics. And to get the most out of stainless you must select with care.

That's why Crucible, a pioneer in the development of this specialty, offers you the services of a staff of metallurgists, well qualified by experience with hundreds of applications, to help you put stainless to work properly.

For more than half a century, Crucible has been the leader in the specialty steel field. There is no substitute for Crucible background — take full advantage of it. When you think of stainless — call in Crucible. CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

CRUCIBLE first name in special purpose steels

51 years of Fine steelmaking

STAINLESS STEELS

STAINLESS • HIGH SPEED • TOOL • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

Mixed shipments easy . . .

. . . using this bulkhead

BIG UNITS for western routes and airtight movable bulkheads for adaptable refrigeration areas take many economic bugs out of long distance haulage of frozen foods by allowing for dry load combinations.

Adjusts Freezer Space to Shipment

Carried right in same truck with non-refrigerated products, partial load of frozen foods is sealed off to make economical cross-country shipment

FROZEN FRUITS and vegetables in quantities ranging from a partial trailer load up to 40,200 lb. are now shipped eastward from the great growing states of California, Oregon, Washington, Idaho and Montana, by Consolidated Freightways, with sixth-morning delivery in Minneapolis, St. Paul and Chicago.

The partial loads of frozen foods are hauled in the front of trucks and trailers that carry dry freight in the remainder of the bodies.

■ **The two loads are separated by means of airtight adjustable rubber-sealed bulkheads.**

Maximum loads of 40,200 lb. are made possible by the use of a double bottom motor train consisting of a six-wheeled truck pulling behind it a three-axle straight trailer. This equipment replaces the tractor semi-trailer combination used in most midwest and eastern states where longer vehicle lengths and heavier axle and gross vehicle weights are permitted.

The Consolidated Freightways, with headquarters in Portland, Ore., serves the territory from 56 mainline terminals. More than 2,000 additional points are served by connecting carriers. In these operations, the company had in service, as of January 15, a total of 1,620 units made up of 282 road trucks; 433 road trailers; 108 road tractors; 170 road semi-trailers; 627 city or local delivery trucks, tractors and semi-trailers; and a fleet of 142 passenger cars.

Regular schedules run by the equipment provide a second-morning delivery from Portland to San Francisco, third morning to Salt Lake City, and sixth morning delivery from San Francisco to Minneapolis, St. Paul and Chicago.

Drawing on its long specialization extending over 20 yr. in the handling of refrigerated and frozen food products, the company developed an insulated, refrigerated body to carry both partial and full loads in order to best serve its shippers, no matter what the season or the size of the load to be moved. This special all-aluminum body is of the closed panel type, completely insulated all around with 6 in. of insulation compressed into a 4 in. space, with spun glass insulation under the floor, and low K-factor insulation in side walls, roof, ends and doors.

The body is refrigerated by means of dry ice carried in a bunker inside the body at the front end near the ceiling. Cakes of dry ice are loaded into the bunker from outside the body through a small airtight door on the right side of the body near the top.

A separate outside full-height door is located on the right side of the body directly to the rear of the ice-bunker loading door. This full-height door permits partial loads of refrigerated foods to be unloaded without disturbing the rest of the cargo.

Movable Bulkhead

The partial-load refrigerated space extends from the front of the body in which the dry ice bunker is located to a removable transverse bulkhead, which is set up at any point along the inside length of the body to accommodate the size of the refrigerated load. The bulkhead is of a two-section type, hinged vertically in the middle.

Refrigerated cargo is loaded first in the front end of the body. Then one half of the bulkhead is set up transversely, directly in back of the load, and the other half swung around even with the first half to form a separate compartment for the refrigerated load.

Century 1 TO 400 H.P. MOTORS

Choose From These Many Types To Fit Your Job

DEPENDABLE CONSTRUCTION . . . Plus

PROPER SELECTION MINIMIZE SHUTDOWNS

Century Electric Company is celebrating its 50th year in the electrical industry.

It's easy to select the proper electric motor for your job from Century's complete line — from 1/6 to 400 horsepower. A wide range of types and kinds are available to satisfy all popular requirements. They are carefully designed, built and tested to assure maximum performance throughout their long life.

Here are examples of Century's line of INTEGRAL HORSEPOWER motors.

Polyphase

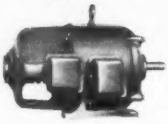
TYPE SC—Open Drip proof General Purpose Motor. Meets the needs of most installations where operating conditions are relatively clean and dry.

TYPE SC—Splash proof. Supplies protection where plants must be washed down. Keeps out all falling or splashing liquids—rain, snow, sleet, etc.

TYPE SC—Totally Enclosed Fan Cooled. Protects against dusts, mist, oil, fog. Inner frame protects vital parts of the motor, seals out harmful matter.

TYPE SC—Explosion proof. Protects life and property in atmospheres charged with explosive dusts or gases.

TYPE SR—Wound Rotor. Open Construction. Ideal for applications requiring low starting current with high starting torque, reversing or adjustable speed.



TYPE SR—Wound Rotor Splash proof. Same electrical characteristics as motor shown above. In addition, gives adequate protection against falling and splashing liquids.

Single Phase

TYPE RS—Repulsion Start Induction, Open Construction, Single Phase Brush Lifting Motor. Combines high starting torque with low starting current.

683

TYPE RS—Splash proof. Same advantages as open construction, plus protection against splashing and falling liquids.

TYPE CSH—Capacitor Start Induction, Single Phase Motor. Suitable when high starting torque with normal starting current is satisfactory.

TYPE CSH—Splash proof. Same advantages as motor shown above, plus protection against falling and splashing liquids.

Direct Current

TYPE DN—Direct Current Motors. Suitable for use where direct current is available, or its use desirable.

TYPE DN—Direct Current, Splash proof.

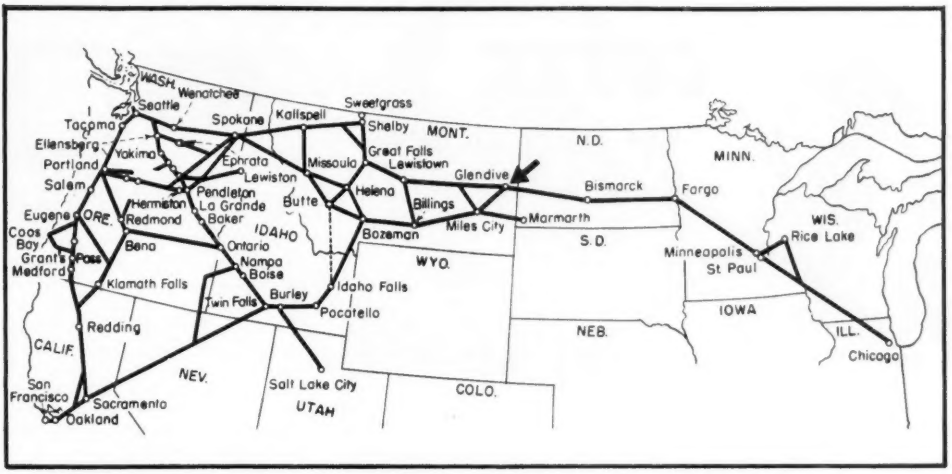
TYPE SY—Synchronous. Suitable for continuous operation at a uniform load for power factor correction.

In addition to a complete line of integral horsepower motors, Century offers fractional horsepower motors, gear motors, generators, AC and DC motor generator sets.

For a long life of satisfactory performance, specify Century motors for all your electric power requirements.

CENTURY ELECTRIC COMPANY, 1806 Pine Street, St. Louis 3, Missouri • Offices and Stock Points in Principal Cities

"Heavyweight" Loads In West Justify Transfer at Glendive



EAST OF MONTANA loads are limited to about 30,000 lb., while to the west they run closer to 40,000 lb.

The balance of the non-refrigerated load extends from the rear of the bulkhead, as placed, to the rear doors of the body through which it is loaded and unloaded. Only the refrigerated portion of the load is unloaded through the body side door.

Made Airtight

The bulkhead extends from the floor to the ceiling of the body and from the aluminum lining on one side of the body to that on the other. The compartment thus formed is made air tight, to retain the refrigerating air, by means of rubber seals on all four edges of the bulkhead.

Circulation of cold air in the refrigerated compartment is provided by means of a small fan in the front end of the body close to the dry ice bunker. The cold air passes completely around the load via sides, ends, top and bottom. The fan blows the cold air from the top down the front and rear ends of the load and through any spaces in the load itself. It passes down the sides of the load between vertical ribs of the aluminum side linings of the body.

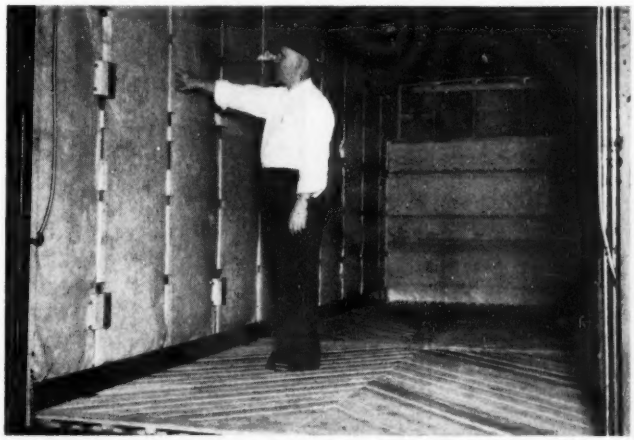
Floor of the body is made of channeled aluminum. The load itself rests on top of herringbone floor racks hinged to the sides of the body for better and easier cleaning of the floor. The racks are swung down directly on top of the longitudinal floor channels. Spaces between these channels permit the lengthwise circulation of the cold air, so in effect the load is carried on a layer of such air.

Control of the temperature inside the refrigerated compartment, while the vehicle is in transit, is provided by means of thermostats and a thermometer mounted on the outside of the body in a shallow compartment protected by a hinged enclosing door. The thermometer shows the temperature inside the body, and thus it is unnecessary for the driver to open any of the body doors to find out how cold it is inside and thereby lose some of the precious cold air.

In operation, any body carrying a refrigerated or frozen food load is precooled by inserting blocks of dry ice in the bunker before the cargo is loaded. Once the load has been brought down to the desired temperature and the vehicle starts on its route, thermometer checks are made at stated intervals by the driver, to make sure that the desired inside temperature is maintained.

When indicated, additional dry ice is supplied from company terminals along the mainline routes. On the long transcontinental shipments, the dry ice is replenished approximately every 8 to 10 hr., the amount replenished depending upon the outside temperature and the temperature to be maintained inside.

With replenishment of dry ice thus assured through its own route terminals, the company prefers the thermostatically-controlled dry ice system to the self-contained mechanical system, such as used by many other refrigerated truck lines on runs where the dry ice



INSULATED aluminum body is of closed-panel type. Channeled aluminum floor, covered by wooden racks, permits circulation of cold air under load.

THIS MAY HELP

Cost-minded and Sales-minded executives are checking up on their packaging methods more closely than ever . . . They have found that modernization in this department pays off quickly —in lower costs and increased sales.

Modern "PACKAGE" machines operate faster—lower labor costs . . . Require less supervision and maintenance . . . Save packaging material . . . It is not uncommon to find a machine paying for itself in a few months' time!

These cost-cutting machines can be adapted to produce the latest and most sales-appealing types of packages with practically any kind of material. You can, therefore, design a package exactly suited to your product and your sales promotion methods . . . A package that packs a real sales punch!

Here at "PACKAGE" you'll find 38 years of unexcelled experience gained in serving package goods manufacturers in every field. Why not take advantage of it?

Write for our leaflet "Packages that Sell"

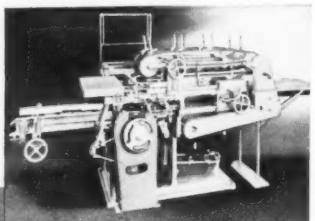
PACKAGE MACHINERY COMPANY • Springfield, Massachusetts

NEW YORK CHICAGO BOSTON CLEVELAND ATLANTA DALLAS
DENVER LOS ANGELES SAN FRANCISCO SEATTLE TORONTO MEXICO, D.F.

Most widely used of all wrapping machines – Model FA. One of over 80 models in our line.

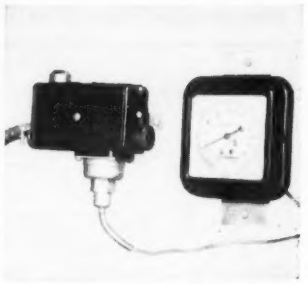
•

We have machines for wrapping a wide variety of products and machines that make cartons from low-cost die-cut blanks.



PACKAGE MACHINERY COMPANY

Over a Half Billion Packages per day are wrapped on our Machines



THERMOSTAT and dial thermometer are mounted for driver's outside view.

supply is unobtainable or unsatisfactory because of its high price. The dry ice system is reported able to maintain any desired inside temperature within a 5 deg. range. Having few moving parts, there is little likelihood of mechanical trouble.

Some idea of the reliability of this company's system may be had from the fact that in 1949 it moved 130,300,000 lb. of refrigerated and frozen food loads with a claim ratio of less than ½ percent of gross revenue.

Big Unit Loads

One other unusual characteristic of the Consolidated Freightways operations—at least to easterners and midwesterners—is the employment of mainline road trains consisting of a six-wheeled truck pulling behind it a six-wheeled straight trailer. This equipment contrasts with the more familiar eastern and midwestern tractor and semi-trailer with a single or tandem axle.

Purpose of the company's special equipment is to take the fullest advantage of the motor vehicle laws in the states of Washington, Oregon, California, Idaho, Utah and Montana. Those states permit overall vehicle lengths of 60 ft. and 72,000 lb. gross vehicle weights, as compared with allowable overall lengths of from 45 to 50 ft. and gross weights as low as 59,000 lb. in many eastern and midwestern states.

The basic Consolidated truck and trailer combination has six axles; has an overall length of 60 ft., with 50 ft. of loading length; has an unladen weight of 31,800 lb.; and has a gross allowable weight of 72,000 lb. This permits a maximum payload of 40,200 lb., which is about 10,000 lb. more than the approximate payload of 30,000 lb. permissible on the eastern and midwestern tractor semi-trailer units.

Saves Manpower

Along with the greater payload per power unit goes a resultant saving in driver manpower per ton-mile. This

is a considerable advantage in an industry where payrolls customarily approach 50 percent of operating revenues.

The company states it has not encountered any serious difficulty in backing or maneuvering its straight trailers with the pulling trucks or yard "mules." All road trucks and trailers are backed up to docks for loading and unloading, except for the partial refrigerated loads taken out the side doors before the balance of the load is disposed of.

Fast Loading

By disconnecting the truck and the straight trailer and loading both units simultaneously, actual loading time may be less than with a semi-trailer. On most long hauls, there is no difference in running time with the two different types of combinations.

The company has certain operations where tractors are an advantage, and others where they have to be used to comply with length and weight restrictions. Tractor semi-trailers are preferable on short-haul turnarounds, where the tractor can make several round trips a day by using several semi-trailers to eliminate the tractor waiting-time for loading and unloading. And on drops at consignees' docks, semi-trailers permit the tractors to proceed and perform other work.

Transfer Loads for Chicago

Consolidated is forced to use tractor semi-trailers east of Montana on its main line into and out of Chicago. All loads are transferred at Glendive, Mont.

The comparative load ratio between west and east is 3 to 2. It requires three tractor semi-trailer schedules into Glendive from the east to fill two truck and straight trailer schedules to the west, and vice versa.

This carrier estimates that it could increase its daily tonnage movement by one-third on 40 percent of its rolling stock and decrease the overall transit time by 6 hr. per schedule—if the state laws east of Montana would permit it to operate its western type combinations through to Chicago.

There is normally more westbound transcontinental freight available than eastbound. The perfect truck line operation would be one in which the tonnage in each direction is equal. But this is not the actuality. Hence, Consolidated, desiring to better balance its tonnage, filed on Mar. 1, 1950 a special eastbound rate of $2.85 cwt. on refrigerated and frozen fruits and vegetables between west coast points to Chicago, as compared with a previous rate of $4.54 to Minneapolis and St. Paul and $5.51 to Chicago.

1901-1951

50th Anniversary

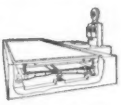
Today, more than ever, you can look to

TOLEDO

to guard your costs better!

Avoid waste . . . avoid losses through careless handling of food! Tighten your control at every step! See that you have up-to-date scales—and enough scales—throughout your food processing and packing operations! Look into the advantages of Printweigh in stopping losses that originate through human errors. Whatever your problems in receiving, batching, ingredient weighing, packaging, shipping or other weighing . . . operations there's a modern Toledo to do the job with high *accuracy, speed,* and *dependability.*

Today in your community you'll find Toledo as near as your phone; Toledo sales and service offices in more than 200 cities ready to help you in the selection or maintenance of scales vital in guarding your product-quality and costs.


TRUCK SCALES

PORTABLE SCALES

FLOOR SCALES

PRINTWEIGHS

Write for a copy of our 50th Anniversary Brochure . . . helpful information on modern Toledo equipment.

TOLEDO SCALE COMPANY

TOLEDO, OHIO . . . Toledo Scale Company of Canada, Ltd., Windsor, Ontario

HEADQUARTERS FOR SCALES

PRODUCE MORE WITH YARWAYS...

Is higher production your aim?

Then Yarway is your steam trap. Best steam trap performance requires condensate drainage *plus*—

1. **Air and gas removal.**
2. **Velocity scrubbing of condensate from heat transfer surfaces.**
3. **Keeping highest average temperature in the equipment.**

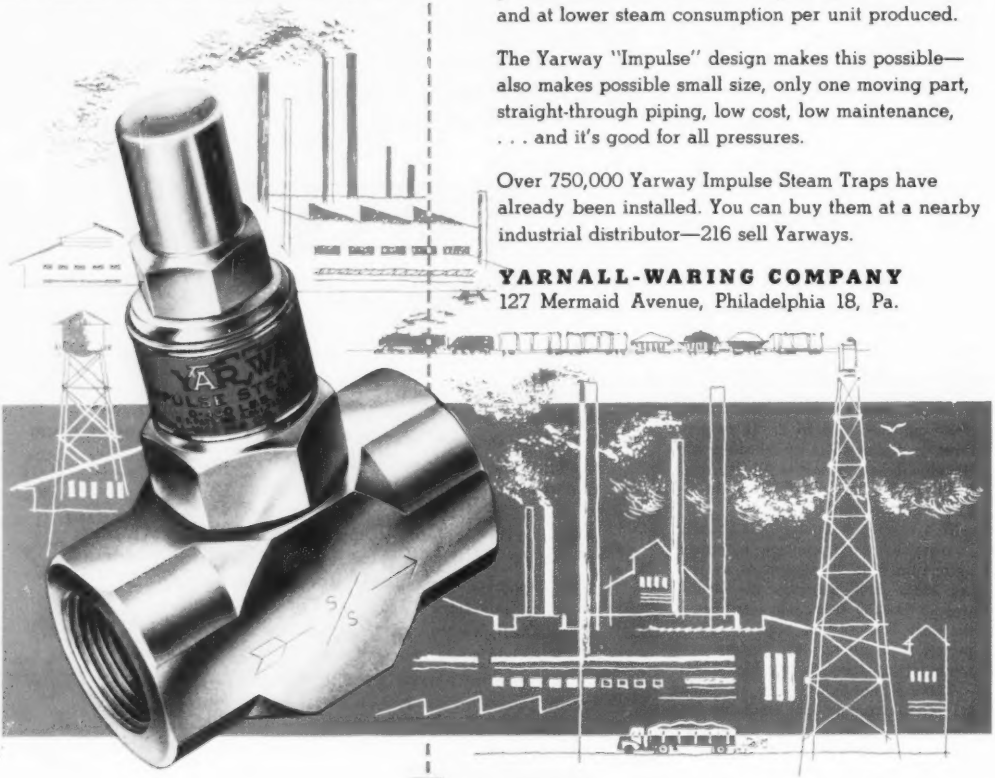
Yarway Impulse Steam Traps do all this, *sending the most premium B.T.U.'s at top temperature into your process or product.*

That's why equipment drained with Yarways gets "hotter, sooner" . . . why better quality and higher production rates are so often reported, and at lower steam consumption per unit produced.

The Yarway "Impulse" design makes this possible—also makes possible small size, only one moving part, straight-through piping, low cost, low maintenance, . . . and it's good for all pressures.

Over 750,000 Yarway Impulse Steam Traps have already been installed. You can buy them at a nearby industrial distributor—216 sell Yarways.

YARNALL-WARING COMPANY
127 Mermaid Avenue, Philadelphia 18, Pa.



FREE OFFER
Don't take our word for it. Test Yarway's production advantages in your own plant, without cost or obligation. Drop us a card. A trial trap will be delivered promptly.

YARWAY the steam trap designed with production in mind

Boost Your Plant Efficiency

—*Continued from page 90*

ings in time and labor have been attained through a company-devised system of unloading cooking kettles, transporting the candy to cooling slabs, and dumping the confection onto the cooling tables.

Formerly, candy was drawn off the kettles, caught in a carrying bowl supported by a metal frame on a dolley, and transported by two men to the cooling slabs in an adjoining room. At this point, the men lifted the bowl from the frame and poured the candy onto a slab as they carried the bowl the length of the cooling table.

Now the task is simpler and easier. The stainless steel bowl is suspended from a trolley on an overhead monorail that facilitates transfer of the candy from cooking kettles to cooling slabs.

At the cooking station, the kettles are located on a platform about 3 ft. above the floor. Here, the bowl is lowered by chain hoist into a frame directly below a kettle. To fill, the operator first pulls a lever to raise the agitator from the kettle. Then he pours off the candy (from some kettles by discharge pipe, from others by tilting). Next, the bowl of candy is weighed, raised with the chain hoist, and pushed along the monorail to one of the cooling tables. Candy is then poured onto the table by opening a slide valve at the bottom of the bowl. By pushing the bowl along the overhead monorail, candy goes onto the table evenly.

Editor's note—For process-line details on the manufacture of this company's candy bars—fudge, mint, and Powerhouse (a chocolate-coated triple layer of caramel, creamy fudge, and caramel-peanut mix), see p. 72-75, July, 1950 FI. Here, too, are "flow-sheeted" the fudge, mint, and Powerhouse-bar operations.

End (*Resume reading on page 91*)

"Rolling Control" of Quality

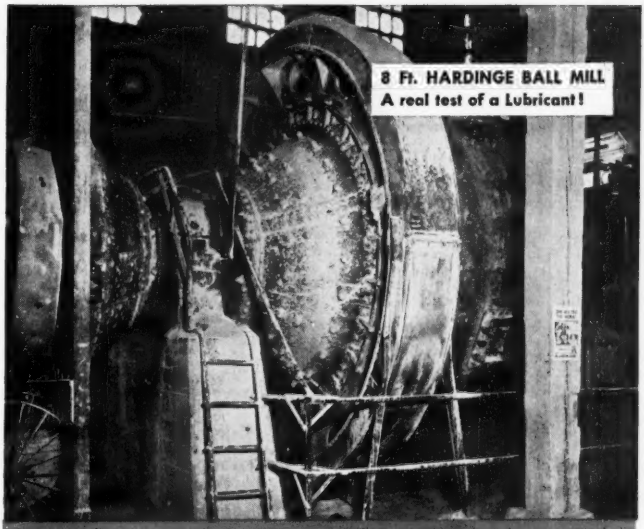
—*Continued from page 65*

and filling height, but also by checking syrup content and carbonation.

Before they leave a plant, the chemist and technician sit down with the plant management in a friendly discussion of the survey results. Detailed suggestions and recommendations, based on a sound foundation of observation, tests and practical experience are presented.

Since Bottlers' Service acts as an

(*Turn to page 152*)



"LUBRIPLATE No. 630-AA is practically a universal lubricant"

—so writes the SPOKANE PORTLAND CEMENT COMPANY of Irvin, Wash.

"**Lubriplate Lubricants** enabled us to cut the number of lubricants we were using to about half, but even then we were still using five different LUBRIPLATE Products. With the introduction of LUBRIPLATE No. 630-AA, we were able to reduce our requirements still further. Today we are satisfying all our needs for solid type lubricants with only two LUBRIPLATE Products. LUBRIPLATE No. 630-AA might almost be considered a Universal Lubricant. Furthermore, LUBRIPLATE No. 630-AA has effected a marked savings in lubricants and labor."

Frank D. Neill
General Superintendent

SIMPLIFY YOUR LUBRICATION SCHEDULE

Lubriplate Lubricants set new high standards: They reduce friction, wear and power consumption. They prevent rust and corrosion of bearings, parts and product. They last longer than ordinary lubricants. LUBRIPLATE Lubricants are available from the lightest fluids to the heaviest density greases to meet all conditions, usual and unusual. Write for case histories of the use of LUBRIPLATE in your industry.

LUBRIPLATE DIVISION
Fiske Brothers Refining Company
Newark 5, N. J. Toledo 5, Ohio

DEALERS EVERYWHERE . . . CONSULT YOUR CLASSIFIED TELEPHONE BOOK

LUBRIPLATE *THE MODERN LUBRICANT*

NEW PACKAGES & PRODUCTS

Cheese Pack for Medium Size Family

Supplementing its ½ and 2 lb. Velveeta package, Kraft Foods Co., Chicago, is now marketing in 1 lb. size its pasteurized process cheese food.

Results in test areas were termed extremely satisfactory, and the new package was to be placed in national distribution by the middle of April.

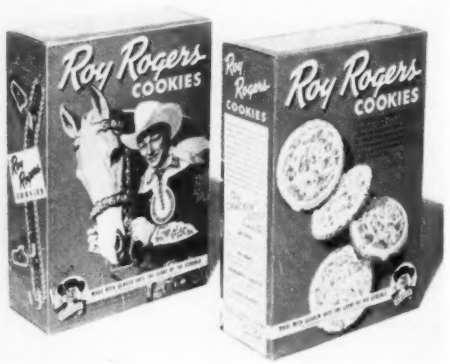
Wine Vinegars in Five Varieties

A line of vintage wine vinegars has been introduced by Frederick Lawrence Co., Cambridge, Mass., under the Harvard House label.

Flavored with herbs, the five varieties are Chef's Bouquet, Garlic, Tarragon, Basil, and Red Hot.

These vinegars contain a blended variety of spices balanced with the grainage of wine vinegar. Burgundy wine, at least two years old, is used exclusively in the processing of the product.

A fully automatic, high-speed, stainless-steel bottling line handles the filling of the vinegar into 12 oz. jug-type bottles, furnished by Tygart Valley Glass Co., Washington, Pa. Attached to the handle of each bottle is a folder containing suggested ways of using the vinegar. The colors of the folder match the wine-red and white employed in the label, by Vose-Swain, and on the closure by Crown Cork & Seal Co., of Baltimore.



3-Way Tie-In on Related Items

Following the new trend of related-item promotion, Carr Consolidated Biscuit Co., Wilkes-Barre, Pa., has joined with Roy Rogers, cowboy star of Republic Pictures and Quaker Oats, Chicago, to promote its new oatmeal cookie.

Reasons for the choices in the tie-in: First, of Roy Rogers, because of the current popular trend of the "Western" and the fact that he is a national favorite with the youngsters. Second, of Quaker Oats, because the cookies are made of Quaker Oats and the company believes that the great popularity of the product and its trademark have a very definite sales appeal.

The cookies use the Quaker Oatmeal along with sugar icing in strawberry and vanilla flavors.

The package itself, designed by Jim Nash, New York City, is of a gay and eye-compelling design. One side features Roy Rogers with Trigger, his horse. Below in small black type are the words "Made with Quaker Oats the Giant of the Cereals," together with the familiar Quaker Oats trademark. Below this, appears the company name—Carr-Consolidated Biscuit Co., Wilkes Barre, Pa., in two lines of small black type.

In addition to this three-way tie-in, another new packaging feature provides the designer with a credit line. Prominently displayed on the narrow side of the carton there is printed—"This carton designed by the eminent package designer," followed by a reproduction of "Jim Nash" signature. The other narrow end carries a photo of a child's Roy Rogers cowboy belt now being sold in stores throughout the country.

In presenting this product, an added lure to promote impulse buying is the offering of a cardboard Roy Rogers six-shooter gun that can be popped with a loud bang. This gun is attached with a rubber band on the oustide of the package so that it catches the eye immediately.

The cartons are printed and manufactured by Empire Box Co., Garfield, N. J.

To get an extra special treat
The Joneses just go down the street,
Where sundaes, sodas, and great shakes
Are rich with the STRAWBERRY NORDA makes

Taste a sun-plump strawberry. It tastes like Norda Strawberry Flavor.

Norda Strawberry Flavor has the kind of true strawberry goodness that grows in a strawberry patch. Norda skills have produced it to rival the taste of real fruit at its finest.

Test both genuine and imitation Norda Strawberry Flavor for aroma, taste, and natural character. Try both in your syrups, gelatins, icings, ice cream mixes, and candies. See if you don't honestly agree Norda Strawberry improves your products.

Get generous samples of Norda Strawberry —*free*—by sending for them today. Ask for the new Norda Flavor catalogue, too. Write soon—right now.

Norda Strawberry . . .
"Another Favorite to Flavor It"

Norda ESSENTIAL OIL AND CHEMICAL COMPANY, INC.
601 West 26th Street, New York 1, N. Y.

CHICAGO • LOS ANGELES • ST. PAUL • MONTREAL • TORONTO • HAVANA • MEXICO CITY • LONDON • PARIS

Uncooked Food for Thought

New, untrained, or day-dreaming personnel can cost you customers and money — by letting uncooked food slip by.

You can guard your quality and reputation with ATI Cook-Chex. These quality control tags attach to retort baskets right through your processing. They tell by an infallible color change when each batch is properly cooked, or which batch, if any, has been overlooked.

Certainty is assured every time, no matter what your cooking time or temperature. Simple to use. Savings in spoilage far outweigh the tiny cost. Send for samples *now*.

ASEPTIC-THERMO INDICATOR COMPANY

BATCH No._____
RETORT No._____

THE TECHNOLOGIST'S SAFETY SIGNAL

ATI COOK-CHEX

THE COLOR-CHANGING **QUALITY CONTROL TAG**

USED BY THE WORLD'S LEADING FOOD PROCESSORS

Write for Free supply of samples for trying in your own retorts

Quality Control Division, Dept. FI-5
5000 W. Jefferson Blvd., Los Angeles 16, Calif.

Send samples of ATI Cook-Chex and valuable quality control data.

My Name .....
Title .....
Company .....
Address .....
City ..... State .....

Overseas Candy Pack Meets Popular Demand

With confections one of the most popular items being sent overseas to foreign countries, Stevens Candy Kitchens, Inc., Chicago, has reissued its combination candy pack under the Freedom Package label.

Each package contains three sealed cans of candy. This comprises one 12 oz. can of green frosted mint juleps, each wrapped in cellophane; one 24 oz. can of chocolate nut fudge in a roll ready to slice; and, one 16 oz. can of an assortment of hard candies.

The three tins are packed in a corrugated box, complying with overseas mailing specifications.

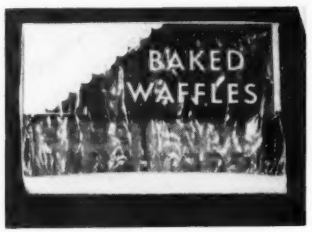
The package was designed by William Stark, Chicago. Fortune Press, Chicago, furnishes the labels, and Heekin Can Co., Cincinnati, the cans.

Cottage Cheese In Bowls

Cottage cheese packaged in re-usable bowls has been introduced by Golden State Co., Ltd., San Francisco.

The light green Fire-King ovenware bowls, holding 12 oz. of cottage cheese, are manufactured by Anchor-Hocking Glass Corp., Lancaster, Ohio. Lids on the new containers are made by Sterling Seal Lid Co., Erie, Pa.

The colorful bowls can be put to many uses after being emptied. They are the right size for cereals, individual oven casseroles, custards, and for reheating leftovers.



Waffles In a Minute

Pre-baked, frozen waffles that can be prepared in a minute are now being offered by Associated Frozen Foods Corp., New York City, for national distribution.

Six pre-baked waffles are packed in

a chipboard carton. Over the top half (see photo) is a folded paperboard giving the name and brand, while the bottom half is open so that the waffles are visible. Overwrap is of Sylvania MS-6, a moisture proof cellophane supplied by Sylvania Div., American Viscose Corp., Philadelphia.

It is said that the frozen waffles can be kept in the freezer unit of a home refrigerator for several weeks. When ready to use, it is only necessary to remove the cellophane and pop the waffles into a toaster for just one minute. Or, they can be placed in a 400 deg. F. pre-heated oven for 2 minutes.

Prepackage Bag for Apples

Improving on its Dent-O-Pak handle-header apple bag, introduced several years ago, The Denton Corp., Oakland, Calif., has now developed a new style which they call the Dent-O-Pak "skirt" header bag.

In this new design, a skirt at the bottom of the header eliminates the possibility of the Pliofilm being cut by the sharp edge of the header.

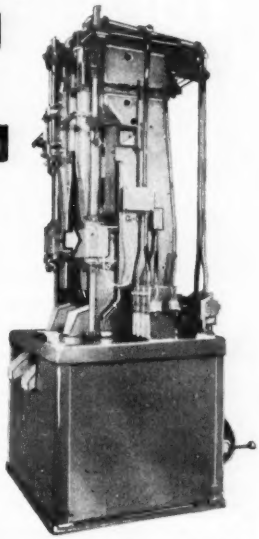
This edge now flares out with the contents (see illustration). Also, it causes the header to stand up in a more or less fixed position, which adds to the appearance of the package on display. All the printing is on the header, leaving the Goodyear Pliofilm free of printing for maximum visibility of contents.

Aim of the design was that apples packed in this bag should have not only an eye-catching sales appeal but also that their shelf life should be increased, with longer retention of crispness and flavor. Note "breathing holes" in the bag to provide for release of gases given off by the ripe apples.

TRANSWRAP

package your liquid products automatically at lower cost!

✓ lower **initial costs**
✓ lower **operating costs**
✓ lower **maintenance costs**



LIQUID FEED UNIT, SHOWN—designed to package all types of liquids and semi-liquids. Output 40 to 120 per min.—5 cu. in. to 80 cu. in.; pillow or fin-seal pkgs., all heat-sealing materials, sizes—1-13/16" x 3" to 5¼" x 13". 4' x 5' x 8'; 2150 lbs., ¾ h.p. motors, 1600 w.

Leading, nationally known packagers have installed Transwrap liquid feed machines—for their (1) simplicity, (2) three-way economy, and (3) versatility. Their records prove high labor savings—one machine equals the output of fifteen to eighteen hand operators; plus additional savings on eliminating the purchase of ready-made bags. "Downtime" is practically eliminated; repairs are negligible.

Transwrap liquid feed machines offer you the full advantage of automatic, hi-speed packaging of a limitless variety of liquid and semi-liquid products — in the food, drug, chemical and other processing fields. Just to name a few . . . catsup, salad dressing, mustard, sauces, horse-radish, flavoring agents, oleomargarine, cheese, preserves, jams, paints, extracts, liquid chemicals and pharmaceuticals.

TRANSPARENT-WRAP MACHINE CORP.
HASBROUCK HEIGHTS, N. J.

Need Help? Transwrap's engineering staff will be glad to assist you in analyzing your packaging requirements . . . make specific recommendations designed to improve your production—at lower costs.

Naturally, there is no obligation for this consultation service. Just check the coupon below.

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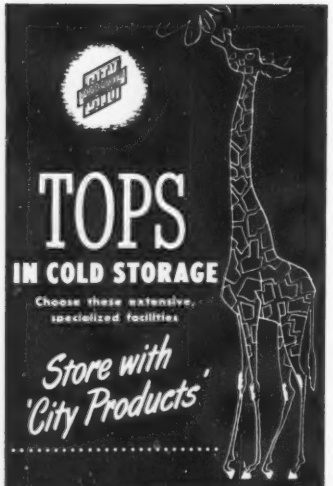

15 NATIONWIDE COLD STORAGE WAREHOUSES

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Federal Cold Storage Co.
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Polar Service Company
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North American Cold Storage
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Federal Cold Storage Co.
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CITY PRODUCTS CORPORATION
COLD STORAGE DIVISION
33 S. CLARK ST., CHICAGO 3, ILL.

Sugar Cartons Redesigned

Pioneering as it did in the factory-packed paper bags for sugar, Savannah Sugar Refining Corp., Savannah, Ga., is now changing cartons for its special sugars.

Instead of the conventional style, its specialty sugars—Light Brown, Dark Brown, and Confectioneers XXXX—are being packaged in newly designed cartons, all in full color, illustrating the use of the products. Icings, frostings, tarts and pineapple upsidedown cake are colorfully displayed on the front panels. Recipes are printed on the back panels.

Because these specialty sugars are not essential food items, the company turned to this carton design in order to stimulate impulse buying. Retaining its tradename recognition, the design (shown above) was specially developed to promote appetite and sales appeal. Working with Savannah Sugar on the development of the package were its advertising agency, Burton Wyatt & Co., Savannah, and Robert Gair Co., Inc., New York City, maker of the cartons.

Lemon Powder

Now available to the consumer trade is Lemon Quick, a concentrated lemon powder, marketed by Lemon Quick, Inc., New York City.

It is being offered in 2½ and 3½ oz. bottles. The 3½ oz. size is stated to be equivalent to approximately 31 lemons.

Ingredients are corn sugar, citric acid, dehydrated lemon juice, lemon oil, lemon peel, egg white, calcium phosphate, U.S. certified color. Vitamin C is added.

One teaspoon of this powder mixed with two tablespoons of lukewarm water about equal the amount and flavor value of the juice of one lemon.

The product is packaged in brown bottles, supplied by Brockway Glass Co., Brockway, Pa. The labels, colorfully designed with the predominant colors yellow and green, are furnished by Hammer Lithograph Corp., Rochester, N. Y.

Dessert Decorations in 5 Colors

Color-Deks, for decorating cakes, cookies, candies and ice cream, are now being distributed by Baker Extract Co., Springfield, Mass.

This dessert embellishment is available in five different color types—red, cindies, green, brownies and nonpareils.

Sealed sifter-top disks of clear polyethylene are provided on the jars for easy dispensing. The sifter-top shaker jars have a re-use value as salt, pepper or sugar shakers.

The 2-oz. square Duraglas containers, red plastic closures, and polyethylene sifter disks are supplied by Owens-Illinois Glass Co., Toledo, Ohio.

Codfish In Cans

Two new canned items have recently been introduced by Gorton-Pew Fisheries Co., Ltd., Gloucester, Mass.

One is the 3½ oz. can of strained codfish for babies. It is completely cooked and ready to serve.

The other item, also precooked, is salt codfish in 11½ oz. cans. From it, creamed codfish, codfish balls, hash, or a fish dinner can be prepared. Recipes are given on the can.

Frozen Food Wrap

A new freezer wrap, called Tyton Tite, has been introduced by Marathon Corp., Menasha, Wis. It is reported especially suitable in meat packaging for zero storage preservation.

The wrap is a combination of two dense papers with Tite laminant used to bind the two sheets together and a Tyton coating applied for extra protection and stripping qualities. It is stated that neither the Tyton coating nor the Tite laminating material become brittle at zero temperature.

Another feature of the wrap is its pliability. It fits snugly around irregular cuts of meat, making it possible to expel excess air in the wrapping process. Tyton Tite folds "dead." As it is formed around an object it remains in the position placed. It strips cleanly and easily when the consumer opens the package.

Package & Product Shorts

15-Oz. Economy Size Rice Package

Minute Rice, pre-cooked product of General Foods, New York, is now being marketed in a large economy-size package containing 15 oz. This is in addition to the 5 oz. package now on the market over two years.

Mail-Order Coffee Bags

At the request of a coffee importer, Bemis Bro. Bag Co., St. Louis, recently designed and developed a mailing bag for 1, 2 and 3 lb. packages of coffee. It is a waterproof paper-lined bag sewn with blue thread in narrow seams down both sides. A mailing tag is attached to the wire tie that closes the top of the bag. Brand name is printed on the bag in stencil-type red-ink lettering. —*End*

Increase SALES *appeal* . . .
Raise FLAVOR *levels* . . .
with
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MONOSODIUM GLUTAMATE 99+%
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Increased taste appeal means increased sales appeal. Food processors throughout the country are giving their products taste appeal and more sales appeal through use of Huron MSG and Huron HVP.

The addition of small amounts of Huron MSG and Huron HVP will bring surprising results. No other formula changes are necessary.

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To the broths of chicken and turkey add 2 to 3 ounces Huron MSG in every 10 gallons to make the best soup ever tasted. In solid packs use 2 to 3 ounces Huron MSG in every 100 lbs. of poultry. Dissolve 1½ lbs. MSG in one gallon of water which will be sufficient to treat about 1000 lbs. of poultry, by injecting into the fleshy portions of the carcass. Use 2 to 3 ounces MSG in every 10 gallons of sauce to make a rich "a la king" sauce.

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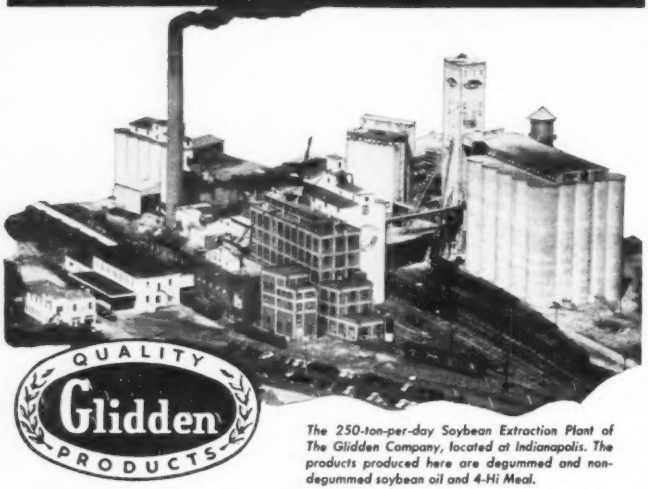
6 DAY FILTERS CONTROL DUST IN THIS SOYA EXTRACTION PLANT



QUALITY Glidden PRODUCTS

The 250-ton-per-day Soybean Extraction Plant of The Glidden Company, located at Indianapolis. The products produced here are degummed and non-degummed soybean oil and 4-Hi Meal.

The Glidden Company has assumed a leading role in the nation's food, paint and chemical industries and today operates 37 plants and two mines in 25 communities. Visualizing the soybean as a vastly important source of raw materials for food, feed, paint and chemicals, Glidden established soybean research and processing plants at Chicago and Indianapolis.

Important in soybean processing is the elimination of the dust problem. For this purpose Glidden chose **DAY** Dust Control systems with highly efficient **DAY** Type "AC" Dust Filters.

6 FILTERS, 4 COMPLETE SYSTEMS INSTALLED IN INDIANAPOLIS PLANT

System one includes one **DAY** Type "AC" Dust Filter installed on the pulverizer grinding system used for grinding toasted flakes into meal.

System two combines two **DAY** Type "AC" Dust Filters operated in parallel for dust control on the bean preparation operations, including de-hulling and the collecting of dust off the flakes before they are transmitted to extraction.

System three consists of the extraction filters. Two **DAY** Type "AC" Dust Filters are connected in parallel and recover dust from the hull cyclone and the meal cooler cyclone.

System four utilizes one large **DAY** Type "AC" Dust Filter which is divided into two sections and located on the track shed roof. Section one collects dust from the bulk meal car loading system; section two collects dust from the grain unloading operations at the elevator.

DAY CAN SOLVE YOUR DUST PROBLEM

Since 1881, The **DAY** Company has specialized in engineering, manufacturing and installing dust control systems. **DAY** engineers are ready to serve you efficiently and economically regardless of the dust situation in your plant.

For complete information about **DAY** Dust Control Systems and the **DAY** Type "AC" Dust Filter, Write-to-**DAY**.

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"Rolling Control" of Quality

—Continued from page 145

industrial clearing-house for betterment of manufacturing processes and elimination of problems, the laboratory has at its command the collective ideas and experiences of the industry. This obvious advantage is the No. 1 selling point in stimulating incentive and encouraging adherence by bottlers to the best practices.

For permanent record, the previously mentioned report, when it is received at the Atlanta office, is typed, bound in an appropriate folder, and returned to the bottler with an accompanying letter reiterating recommendations.

Duration of the survey varies with the plant's size—from one day, in the smaller operations, to as much as a week for multi-unit plants. To solve an unusual situation, the laboratory remains as long as may be necessary to clear up the difficulty.

Data accumulated from thousands of surveys is continually stockpiling in a wealth of valuable working information covering the beverage operation from A to Z—with constant winnowing and sifting, proving and disproving methods and practices. Thus, the merit of this system keeps increasing.

Modified Trailers Used

The rolling laboratory has been designed to meet the entire requirements for quality control in any bottling plant. It was provided by making minor construction changes in a stock model house trailer. The unit is towed by a passenger car, the exterior of both car and trailer being painted a distinctive red and white.

Among the basic equipment is a specially designed water-testing cabinet for volumetric determination of alkalinity, hardness, sulfates, and chlorides, and colorimetric determination for pH, chlorine and iron. A centrifuge and microscope are included for separation and examination of sediment, particularly any organic matter in the bottling water that may cause filling and carbonation troubles. There are an incubator, a hot water bath and an autoclave for complete bacteriological testing, a constant speed stirrer for coagulation tests, and a dead-weight gage tester for checking accuracy of pressure gages essential in controlling uniformity of carbonation.

All miscellaneous glassware is carried in carefully proportioned drawers, safeguarding it in traveling. Cabinet tops are arranged for convenient work space. A 10-gal. storage tank makes water quickly available, and a small stainless steel sink allows ready disposal of waste.

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Slap-proof
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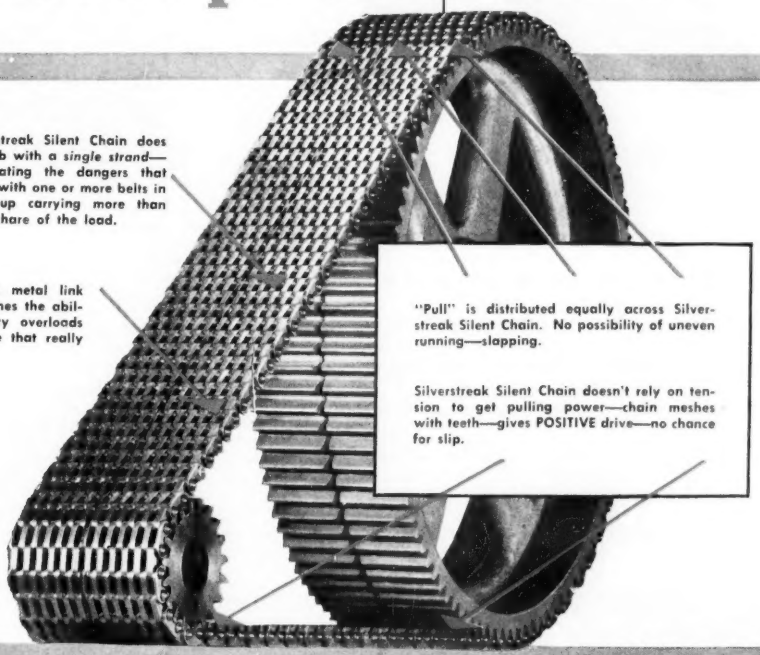
There's no stretch, no slippage with Link-Belt Silverstreak Silent Chain Drives. You're sure of *positive* transmission of every unit of horsepower your motors develop. For every rating, every design has been proven 98.2% efficient.

You conserve space, too—Silverstreaks operate efficiently on extremely short centers. Ratios as high as 10-to-1 are commonly used.

For high speeds—for tough operating conditions—for years and years of trouble-free service—you can't beat Link-Belt Silverstreak Silent Chain Drives.



Silverstreak Silent Chain does the job with a *single strand*—eliminating the dangers that come with one or more belts in a group carrying more than their share of the load.

Husky Silverstreak metal link construction combines the ability to carry heavy overloads with the resilience that really absorbs shock.

"Pull" is distributed equally across Silverstreak Silent Chain. No possibility of uneven running—slapping.

Silverstreak Silent Chain doesn't rely on tension to get pulling power—chain meshes with teeth—gives POSITIVE drive—no chance for slip.

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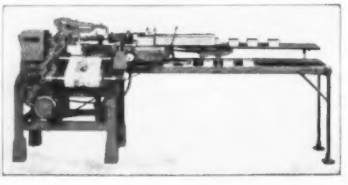

One end of the trailer is allotted to two clothes lockers, a desk, cabinets for stationery and supplies, a small filing cabinet, and a factual library on carbonated beverage operations.

The electrical system, designed to operate on 110 a.c., makes it possible to use the laboratory from any nearby outlet in a building. The puller car is equipped with a special generating system which permits enroute operation of electrical equipment such as incubators. The trailer has an independent heating system and a bottled gas supply.

Utility of the laboratories is exemplified by the fact that during World War II a dozen units were made available to the armed forces for control work in service command areas. Several former employees continued their work in these trailers after their induction into service.

Duties of Personnel

The chemist's duties include water analyses and water-treating adjustment, bacteriological examinations, syrup content determinations, washer solution strength tests, and microscopic work. Tasks of the technician are to make carbonation tests and mechanical, sanitary and efficiency studies of plant and equipment.

An additional responsibility of the chemist is to familiarize himself with the local water supply, since local conditions play such an important role in the bottler's operations. To further this effort, the chemist executes a Water Works questionnaire, covering such factors as source of supply, seasonal variations, details of treatment used, and whether or not any changes in supply or treatment are in progress or contemplated.

Often the information developed by these analyses, and particularly the bacteriological results, is of direct assistance to the city water works. As an example, some months ago in a Western city the bacterial counts on the city water were high and showed an alarming percentage of gas-forming organisms in the presumptive broth test. The unit crew reported this to the bottler, who in turn communicated the findings to the municipal water works authorities. Subsequent tests by health agencies confirmed the positive presence of coliform organisms, and the source of the contamination was traced and immediately corrected.

To supply the needs of this large field organization involves the maintenance of a central laboratory at Atlanta. Here, solutions are made up and properly standardized, and instruments are purchased in quantity and checked for accuracy. This central

(*Turn to page* 167)

the 6th big reason why

Dowfume EB-15

is "Tops" for food machinery and spot fumigation

1. **Highly effective against all common pests of food processing establishments.**
2. **Low volatility.**
3. **Nonflammable.**
4. **Has a warning odor as a safety factor.**
5. **Economical.**
6. **Time-saving—easy to apply without special equipment.**
7. **Residual effect delays reinfestation of stock.**

Dowfume EB-15 has *many* advantageous features which make it a valuable aid to good housekeeping in food plants. Originally developed by Dow for use in flour mills—this effective low-volatility spot fumigant is successfully used today in many different types of food processing plants.

Spot fumigation with Dowfume EB-15 at monthly intervals, or as needed, between general space fumigation with Dow Methyl Bromide is important. Any machines handling products susceptible to infestation and which are apt to have dead stock accumulations in corners, cracks and crevices should be treated with Dowfume EB-15.

Your pest control operator can do a speedy, thorough job with this outstanding Dow fumigant material. Application equipment for Dowfume EB-15 consists simply of a number of 32-ounce prescription bottles carried in wire baskets similar to those used for carrying milk bottles. The operator pours the fumigant into the various machines as recommended. Slow evaporation does the rest. Low volatility permits Dowfume EB-15 to remain effective for as long as 30 days after application, particularly in dead stock.

For further information—or for the name of your local fumigation service handling time-tested Dow fumigants—write our Fumigant Division.

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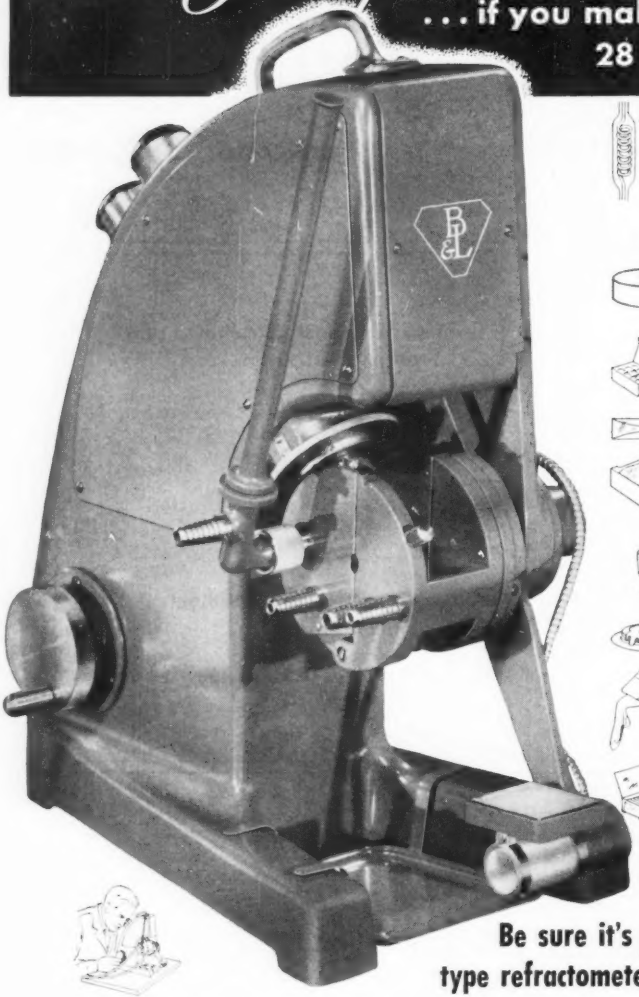

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- DISTILLED WATER
- EGG SOLIDS
- ETHYLANTRACENE
- EXTRA DENSE FLINT
- FLINT GLASS
- FLUORINATED HYDROCARBONS
- FRUIT BUTTERS
- HONEY
- HYDROGENATED FATS
- IODINE NUMBER (FLAXSEED, SOYBEAN)
- JELLIES, JAMS FRUIT PRESERVES
- MAPLE SYRUP
- NAPHTHALENE
- NYLON
- OIL CONTENT
- PAPER MILLS (STARCH SOLIDS)
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- TOMATO PRODUCTS
- WAXES (PARAFFIN, CARNAUBA)

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Exclusive B&L advantages save time, cut costs, increase operator efficiency and comfort . . . in industrial quality control, in research, and in experimentation. Quick, positive determination of the percentage of dissolved solids in foods. Highest-accuracy identification and testing of transparent and opaque liquids and solids, by either transmitted or reflected light. Here are a few of the "Abbe-56" features you'll appreciate in *your* work.

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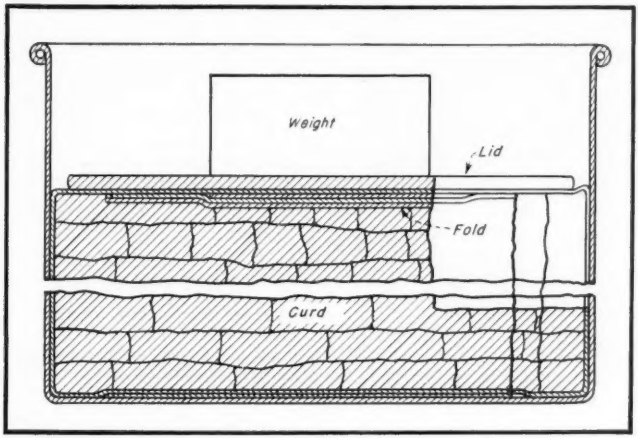
INTERNAL GLASS SCALE—Protected from dirt, corrosion. Index, 1.30 to 1.71; theoretical accuracy, ±.0001.

PROTECTIVE HOUSING—Streamlined metal, safeguards scale and moving parts.

WRITE for complete information and a demonstration to Bausch & Lomb Optical Company, 603-5 St. Paul St., Rochester 2, N. Y.

Bausch & Lomb "*Abbe-56*" Refractometer

ADVANCES IN TECHNOLOGY



Simplified Cheddar Cheese Making Process Reduces Labor, Cuts Trimming Losses

Overcoming difficulties inherent in the conventional method of making Cheddar cheese such as hooping, pressing, paraffining, removing the cloth and paraffin coating after the aging period, and trimming the outer surface to remove mold, is the object of a recently patented invention.

In the improved method, the entire curd content of a cheese vat is placed in a large box lined with an air-impervious wrapping material. The wrapper is then folded over the curd so as to entirely enclose it and a weighted following-lid is placed on the top portion to seal the folds against the curd.

At the end of the ripening period the lid is removed, the wrapping drawn away, and the curd heated to pasteurization temperature (above 150 F.). Any desired condiments may be added to the molten mass at this time.

Digest from U. S. Patent 2,520,183, issued Aug. 29, 1950, on an application dated Nov. 1, 1946, to Conrad Toone, Rochester, Ind., assigned to Armour & Company, Chicago.

Poor Quality Cheese Results From Antibiotics In Milk

Penicillin, streptomycin, aureomycin, sulfanilamide, and sulfamerazine, when used to treat mastitis, are given off in milk in sufficient amounts to restrict growth of lactic acid bacteria. And, if as little as 1 percent milk from a treated quarter is included in that used for the manufacture of cheese, a poor quality product results. When cream is separated from the milk and cultured for butter-making, as little as 1 percent cream from quarters treated with penicillin and streptomycin restricts growth of the lactic acid bacteria, and powder manufactured from this same milk restricts growth of acid bacteria when reconstituted. Powder made from milk containing sulfanilamide, sulfamerazine, and aureomycin, on the other hand, has a definite stimulating effect on acid production in reconstituted milk.

These were results obtained from a number of experiments set up to study effects of these treatments on acid production in milk from treated quarters, and the length of time required for the milk to return to normal after such treatments. Normal milk was considered as milk that would permit growth of lactic acid forming bacteria.

The tests showed there was no diffusion of the drugs from treated quarters to the untreated ones. Therefore, it is recommended that milk from treated quarters be discarded or fed to livestock for 3 days or 6 milkings after treatment.

Digest from "Modern Methods of Mastitis Treatment Cause Trouble in the Manufacture of Fermented Dairy Products," by H. C. Hansen, G. E. Wiggins, and J. C. Boyd, *Journal of Milk and Food Technology*, 359-65, Nov.-Dec. 1950.

BAKING

Long-Keeping Mixes

Ready-mixed flours that can be stored for long periods of time without deterioration of flavor or volume characteristics of the cakes, muffins, breads or cookies made from them are objects of a recently patented invention.

Crux of the invention is use of dehydrated flour with a moisture content of 2-8 percent. This low-moisture flour is obtained by exposure to a temperature exceeding 212 F. for 5-15 min., followed by quick cooling. Also important is method of mixing ingredients. Shortening and sugar are first thoroughly mixed, then the dehydrated flour, powdered skim milk, dried whole egg, leavening agent and flavoring materials are added and the agitation continued until all are thoroughly mixed.

Digest from U. S. Patent 2,525,599, issued Oct. 10, 1950, on an application dated July 8, 1947, to E. G. Gustavson, Clarendon Hills, Ill., assigned to The Quaker Oats Co., Chicago.

Continuous Mixing Process Gives Uniform Batters

An improved method for preparation of cake and muffin batters of a uniform nature that eliminates need for tempering equipment and is said to reduce baking time of resulting products by as much as 10 min., is the object of a recent patent.

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All ingredients to be used in preparation of the batter are measured into a tank equipped with heating coils and motor driven agitator, and mixed until batter will pass through a ½-in. sieve. During mixing, heat is applied to raise temperature of batter to 85-95 F.

Premixed batter is then pumped into a Votator-type unit where it is thoroughly mixed and tempered under pressure, then to a metering device that discharges measured amounts into pans or other suitable containers for baking. In some instances, oxygen, nitrogen or air, to the extent of 15 percent by volume of the mixture, is incorporated in the final mixing stage to provide additional leavening effect. Gas, when desirable, may be added from a tank containing the compressed gas.

Digest from U. S. Patent 2,524,437, issued Oct. 3, 1950, on an application dated Aug. 2, 1947, to G. F. Garnatz, Cincinnati, O., and B. D. H. Miller, Louisville, Ky., assigned to The Girdler Corp.

MICROBIOLOGY

Antibiotics Not Effective Against *Cl. Botulinum*

That antibiotics and mild heat cannot be depended upon to prevent toxic spoilage of canned vegetables is indicated by results obtained in experiments conducted by American Can Co.'s Research Division.

Experimental inoculated packs of peas and corn in brine were prepared using subtilin, gramicidin, methylol-gramicidin, bacitracin, and streptomycin in conjunction with processing at 212 F. Packs were inoculated with a spore suspension of *Cl. botulinum* containing 5 strains each of Type A and Type B. Cans were closed under 20 in. vacuum, processed, water cooled, and incubated at 85 F.

Subtilin in a concentration as high as 80 ppm. permitted 100 percent spoilage in inoculated lots with both Type A and B toxins found present. The same results were obtained with the other antibiotics tested in a single high concentration. None except subtilin even controlled the natural bacterial flora of the vegetables. (See Table below.)

Subtilin and a mild heat treatment were also used for an experimental pack of tomato juice inoculated with spores of *B. thermoacidurans*. No evidence of flat sour spoilage was found in the juice that contained 40 ppm. subtilin. Subculturing of treated samples indicates that this antibiotic may have a destructive effect on this organism.

Digest from "Results of Studies on the Preservative Action of Antibiotics in Processed Foods," from address by J. D. Burroughs and I. E. Wheaton, American Can Co., Maywood, Ill., at National Canners Convention, Chicago, Feb. 19, 1951.

SPOILAGE of Inoculated Vegetable Packs was not Prevented by Addition of Antibiotics

Product	Antibiotic	Concentration Ppm	Inoculum	Spoilage percent
Peas	Subtilin	40 and 80	*Cl. botulinum*	100
Peas	Subtilin	40 and 80	None	0
Peas	Gramicidin	100	*Cl. botulinum*	100
Peas	Gramicidin	100	None	100
Corn	Methylol-gramicidin	100 and 200	*Cl. botulinum*	100
Corn	Methylol-gramicidin	100	None	100
Corn	Bacitracin	40	*Cl. botulinum*	100
Corn	Bacitracin	40	None	100
Corn (soaked)	Bacitracin	40	*Cl. botulinum*	100
Corn	Streptomycin	40	*Cl. botulinum*	100
Corn	Streptomycin	40	None	60
Tomato juice	Subtilin	40	*B. thermoacidurans*	0
Tomato juice	Subtilin	40	None	0
Tomato juice	Subtilin	None	*B. thermoacidurans*	73

True Rapid Vinegar Bacteria Grown on Unenriched Media

Pure cultures of vinegar bacteria have never been found very useful in quick vinegar generators. The *Acetobacter* species, causing diseases in beer and wine, are actually much better known, chiefly because "rapid" bacteria are very difficult to isolate. The classic method of isolating vinegar bacteria was to immerse a shaving or chip from the vinegar generator in some of the mix used for producing vinegar in the factory. When growth was obtained, the bacteria were plated on glucose-yeast-water agar containing chalk to make the acid-producing colonies visible. This method does not necessarily isolate the quick vinegar bacteria, but may merely encourage other bacteria that are present in the generators.

Studies of bacteria isolated in this way, by permitting them to oxidize several substrates in a Warburg apparatus, have shown that they overoxidize alcohol to CO_2 and water, while they also attack both glucose and lactate vigorously. By avoiding the enrichment culture and plating directly from the water used to wash a generator shaving, without Ca CO_3 on the plate, strains of bacteria were obtained that oxidized alcohol to acetic acid, but did not overoxidize it to CO_2 and water. These acetobacters, which seem to be true rapid vinegar bacteria,

attacked lactate to only about 1/10 the extent of the group isolated by enrichment culture, and scarcely attacked glucose at all. They form very small transparent colonies which become opaque after about 3 days. They are very exacting in their nutritional requirements, and complete requirements for their laboratory growth have not yet been worked out. Results indicate importance of method of isolation in the study of acetifying bacteria, as well as necessity of showing that the strains isolated oxidize only alcohol, oxidize it only to acetic acid, and at a rapid rate.

Digest from "Contribution to the Study of Acetobacters of the Rapid Vinegar Type" by J. M. Wiame and R. Lambion, *Revue des Fermentations et des Industries Alimentaires* (Brussels), Vol. 5, No. 6, 209-10, Dec., 1950.

FRUITS AND VEGETABLES

Pre-Freezing Process Insures Green Color of Legumes

In order to preserve in their frozen condition the initial full green color of legumes, such as lima beans, it is proposed in a recent patent to give the vegetable an alkaline bath prior to the freezing process. Preferably, the beans are immersed for about 1 min. in a solution of one percent NaOH at a temperature of 65-70 F. Action of the bath is arrested by washing the beans with relatively cool water before freezing. The enhanced green color is believed to be due to changing the hydrogen ion concentration toward the alkaline side, the adjustment of the pH being upwards by 0.1-0.2 from that normally encountered. Chlorophyll is hydrolyzed to chlorophyllin or other phyllins. The process does not impair the flavor, texture, or nutrient value of the beans, nor is there any skin slippage.

Digest from U. S. Patent 2,520,214, issued Aug. 29, 1951, on an application dated Feb. 14, 1949, to J. R. Kenworthy, Jr., Modesto, assigned to John Inglis Frozen Foods Co., Stockton, Calif.

Frozen Apple Concentrate

A report of studies at Western Regional Research Laboratory in which findings on frozen apple juice concentrate have been used in setting up a projected plant operation is now available. Information used came from extensive studies on processing methods, storage and other factors. The process that appeared most promising, which was developed at ERRL, consists of stripping the aroma and flavor fraction, concentrating both essence and residual juice, recombining the two, and freezing. The resulting 4 to 1 concentrate is successful in retain-

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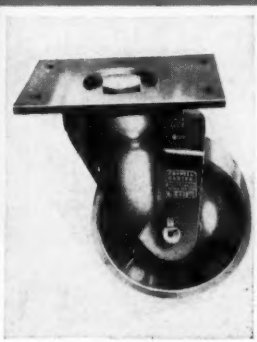

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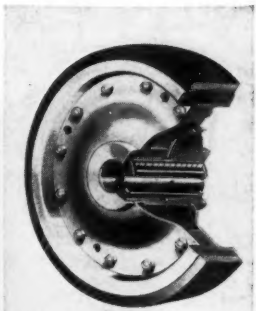

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ing the apple aroma and flavor. A flow sheet is presented, and estimates of probable plant investment and processing costs are given.

Digest from "Frozen Apple-Juice Concentrate: Application of Laboratory Data to Prospective Commercial Operations," by V. F. Kaufman, C. C. Nimmo, and L. H. Walker, AIC-293, Western Regional Research Laboratory, Albany 6, Calif., Nov. 1950.

MEATS

Meat Tenderizing Speeded By New Aging Process

Delaying the chilling of freshly slaughtered meat until after the period of rigor mortis has elapsed is the basis of a recently issued patent that is said to greatly shorten aging period. Customary procedure is to transfer the carcasses of freshly slaughtered animals to coolers almost immediately after skinning and dressing in order to age the meat and make it acceptable to the trade. The period of aging may be 2-3 weeks. It has now been discovered, however, that this aging does not begin to be effective until after a period of rigor mortis which ranges from 16 to 24 hr. after slaughtering. During this period there is an evident toughening of the meat.

According to the present invention a freshly slaughtered carcass is immediately placed in a chamber maintained at 90 percent relative humidity and a temperature of about 98.6 F. for 4-5 hr., at the end of which time rigor mortis is complete. The carcass is then transferred to a cooler where temperature is approximately 34 F. By processing the meat in this manner the transition period is greatly accelerated, and accompanying toughening substantially avoided. Thus the subsequent aging period may be greatly shortened.

Digest from U. S. Patent 2,519,931, issued Aug. 22, 1950, on an application dated Feb. 8, 1947, to H. L. Roschen, Maywood, and B. J. Ortscheid and J. M. Ramsbottom, Chicago, assigned to Swift & Co., Chicago.

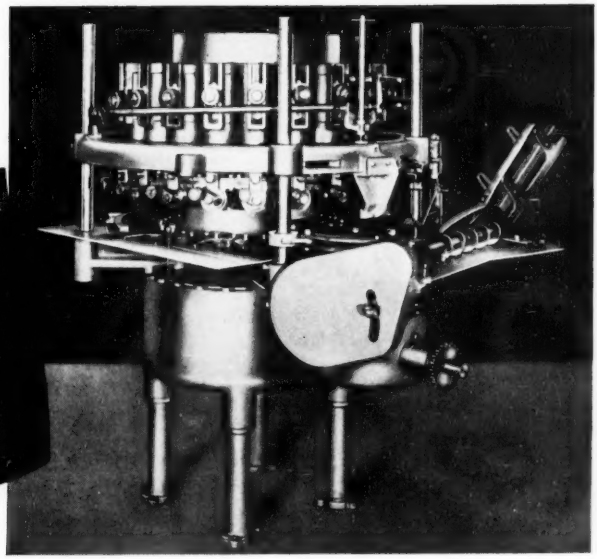
New Bacon-Smoking Unit

Radical departure in design and construction of bacon-smoking chambers has eliminated the disadvantages of earlier rule-of-thumb methods of smoking. Instead of burning sawdust on the floor of the smoke room, it is burned in a brick-lined combustion chamber, smoke from which can be conducted through ducts to one or more rooms. Rate of smoke emission and its density are controlled by dampers in the charging doors of the furnace and in the roof of the smoke rooms. Latter are equipped with heating ele-

(*Turn to page* 165)

PFAUDLER PISTON FILLERS are made in four models. Capacities range from 100 to 600 containers per minute, depending on the product being handled. Will handle containers up to 5 qt. capacity.

PFAUDLER PISTON FILLERS



Faster Filling at Lower Cost

When you are processing for today's highly competitive food market, you want fillers that can deliver large-volume output at top speed. The Pfaudler Rotary Piston Filler not only operates faster, but minimizes spillage. This means you'll need fewer fillers to do the job . . . lower labor, power and maintenance costs. It will help to reduce your waste losses too, because spillage and waste are both negligible with the Pfaudler Piston Filler.

The fast-moving parts of the Pfaudler Piston Filler are precisely machined for greater accuracy. An instantaneous volume adjustment controls the fill within 1/10 of an ounce . . . no topping is required for glass jars. You can easily synchronize the speed with other equipment. And the Pfaudler "no-can-no-fill" feature gives positive protection against spillage and waste.

Cleaning is faster and easier, too! It takes only a few minutes to disassemble the piston and valves. No tools are needed. The elimination of piston rings is an added sanitary feature. Stainless steel or copper-free nickel alloy is used for all parts in contact with the product. There are no wrist pins or connecting rods to wear out. Write for Bulletin 876.

THE DELIVERY SITUATION—Pfaudler Fillers are still available for reasonable delivery. However, with growing shortages of materials we suggest you anticipate your requirements and order as early as possible.

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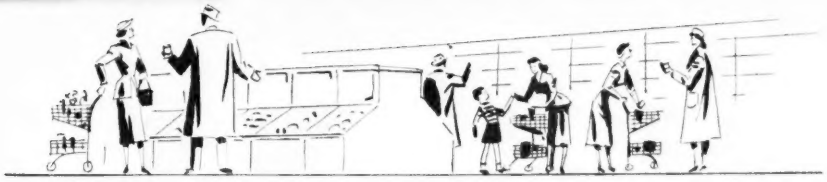


was much more skeptical!

Every self-service shopper, nowadays, is a walking demonstration of the power of faith! She couldn't shop as she does—without benefit of clerks or sales talk—if it weren't for *her faith in the goodness of the food she selects.*

This faith is the foundation of self-service selling—and the greatest asset the food packaging industry possesses! To nurture it, encourage it and augment it is the food packer's first duty.

When a food packer looks at the problem of *building and maintaining consumer faith*, he can't find a better starting point than this principle:

Building consumer confidence isn't only a matter of putting good food into a package. It's also a matter of ***delivering*** *that food with all its original goodness intact—****every time****!*

It doesn't take much study of food packaging history to discover that many a packer's success in self-service selling has been augmented by *the closure method he uses to insure delivery of his original quality.*

* * *

The Vapor-Vacuum method has long been one of the major forces in the whole faith-building process, for a very simple reason . . . *its virtual infallibility as a guardian of freshness and quality.* In millions of homes, each day, Vapor-Vacuum delivers perfectly preserved foods . . . foods no whit different than the day they were packed. It does this so unfailingly that the consumer now takes it for granted.

Thus Vapor-Vacuum's billions of successful journeys into American homes each year have made a tremendous impact on the attitudes and shopping habits of the American consumer.

Lubricant for self-service selling

The whole process of self-service retailing is, of course, built around consumer faith. The self-service shopper couldn't operate as she does without a pretty general confidence in the packages she selects. But it's a good idea to remember that this confidence of hers isn't always universal. *Some packages still inspire more faith than others!*

The type of package the shopper accepts most easily is, of course, the *Glass+Vapor Vacuum kind.* In this package, all the elements for smooth, successful self-selling are always present . . . full visibility and information, maximum appetite appeal, and complete assurance of delivered quality.

The packer who uses Glass+Vapor Vacuum wins 2 ways:

(1) *He contributes to the cause of building still more faith in packaged foods.*

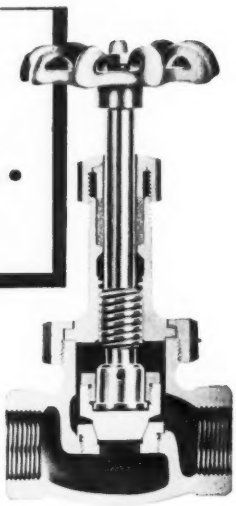
(2) *He gains a competitive advantage, as well.*

WHITE CAP COMPANY, 1819 North Major Avenue, Chicago 39, Illinois.

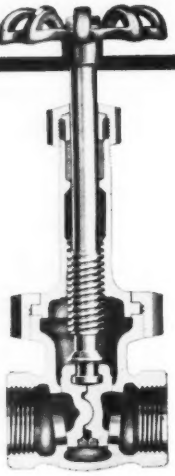
"VAPOR-VACUUM"* Seal and Re-Seal

For example, JUICES! ***The glass package*** **provides the initial attraction, the come-hither look!** ***The Vapor-Vacuum Seal*** **provides assurance of freshness, unvarying flavor, convenience!** ***Together, they're unbeatable!***

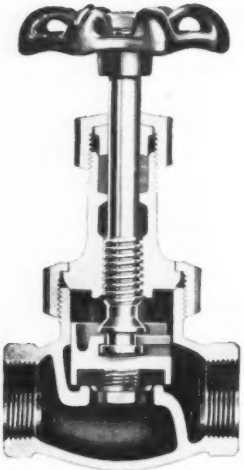
Walworth bronze valves...



Walworth No. 225P Globe Valve
500 Brinell Seat and Disc



Walworth
No. 29 Gate Valve



Walworth No. 95 Globe Valve
Re-New-Disc

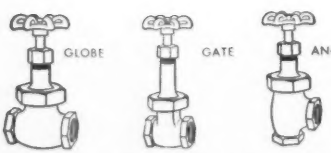
built to give dependable trouble-free service on all recommended jobs

Walworth No. 95 Bronze Globe Valves (Angle Type: No. 96) are recommended for service where throttling is not required. They are rated at 150 psi working steam pressure, 500F; 300 psi cold water, oil or gas. The improved renewable disc and lock-on, slip-off disc holder — an original Walworth development—saves time and trouble. This valve can be repacked under pressure when fully opened. All parts are designed to give maximum service and strength.

Walworth No. 29 Bronze Gate Valves are rated at 200 psi working steam pressure, 550F; 400 psi cold water, oil and gas. These valves have rising stems and integral seats. Sizes 2-inch and smaller have union bonnets; sizes 2½ and 3-inch have bolted bonnets. Valves up to and including ¾-inch have solid wedge discs; 1-inch and larger have split wedge discs. These valves can be repacked under pressure when fully opened.

Walworth No. 225P Bronze Globe Valves (Angle Type: No. 227P) are rated at 350 psi working steam pressure, 550F; and 1000 psi non-shock service on cold water, oil and gas. The stainless steel, plug type seat and disc — heat treated to 500 Brinell — can be closed on sand, slag, scale and similar floatage, without injury to the seating surfaces. They are the longest wearing, TOUGHEST bronze valves you can buy.

For full information about Walworth Quality Bronze Valves, see your Walworth distributor, or write:



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ments which can be thermostatically controlled to give a temperature of 90-95 F. Ducts conveying the smoke dissipate much of the heat of combustion, so that the temperature of the rooms is not unduly affected. Smoke flows continually through a smoke room so that moisture expelled from bacon is removed and does not affect humidity. A room can be filled with dense smoke in 5-min., and cleared again in less than two. Among advantages claimed for the method are: Easy control of temperature; substantial saving in sawdust consumption—up to 50 percent; no contamination of bacon with ash; reduced fire risk; no staining of bacon by condensation; possible use of monorail system for charging smoke rooms.

Digest from "Developments in Bacon-Smoking Equipment," by L. G. A. Leonard, *Food, Processing, Packing, Marketing*, 23-26, Jan., 1951.

RESEARCH METHODS

Paper Chromatography Detects Impurities

Heavy metals, antibiotics, vitamins and other growth factors are easily detected by paper chromatography. With this simple equipment, chemical compounds in extremely complicated mixtures can be separated from one another and identified where usual laboratory procedures fail. And the technic can be employed to detect extremely minute quantities of the materials.

The technic consists of placing a drop of the solution to be analyzed near the top of a long, narrow strip of filter paper which is then dried. Next, the strip is suspended from a reservoir containing an organic solvent saturated with water, with only the last 1-2 in. of the paper dipping into the solvent. The entire apparatus is enclosed in a chamber whose atmosphere is saturated with water and solvent vapor. Solvent absorbed by the paper moves downward by a combination of gravity and capillarity, running through the unknown mixture and carrying the various ingredients along at different rates.

At the end of 12-24 hr., a trail of spots appears somewhere between the limit of the solvent travel and the point where the original mixture was applied. Each spot corresponds to a different compound. Comparison of the position of these spots with those produced by compounds of known structure is used to determine the probable identity of the unknown substances.

The spots on the paper are not usually visible, and special technics must be used to locate their positions. Most generally used technic is to spray the strip with some chemical reagent which

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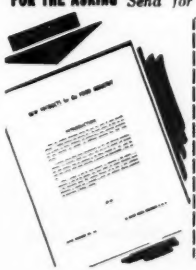

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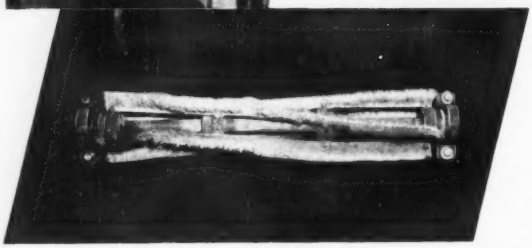

FULLERGRIPT BRUSH

Solves Conveyor Problem on Oyster Dredge

Wet sand and pieces of oyster shell can be very troublesome to conveyor systems, as H. C. Rowe & Co. of New Haven, Conn. found out. Two conveyor installations for unloading oysters had proved unsatisfactory because this material worked into the mechanism and caused frequent stops for repairs. Also, these "fines" as they are called, accumulated underneath the conveyor. About six hours were required every trip to clean them off.

W. H. Milroy & Co., New Haven engineers, were called in. On the conveyor system they designed, they mounted a semi-spiral Fullergript brush just below the pulley at the discharge end of the belt. This Fullergript brush flicks the "fines" into elevator buckets which carry the oysters overboard. The hand cleaning of "fines" from the belt is eliminated...saving hours of labor every trip.

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will form colored derivatives with the compound under investigation. Biological tests have been used extensively for locating the position of antibiotics and vitamins or other growth factors. By laying the strips on agar plates seeded with bacteria, zones of inhibited growth will reveal the location of antibiotic substances, while growth-accelerating factors can be detected by the surrounding areas of luxuriant growth.

Digest from "Metal Impurities In Food and Drugs Spotted By New Technique," a paper by A. J. Glasko, Parke, Davis & Co., Detroit, presented at ACS meeting, Chicago, Sept. 5, 1950

MISCELLANEOUS

Constituents of Cottonseed Change As Plants Grow

Progressive changes, from the time the blossom opens until the bolls are harvested about 60 days later, take place in the oil, carbohydrates, fiber, and ash contents of cottonseeds. Measurements on American upland variety of cotton, grown in Egypt between Aug. 1949 and Jan. 1950, were made on bolls that had been marked as soon as blossoms opened.

Beginning with bolls from which seeds could be easily separated (3 weeks after the blossom opened), the seeds outweighed the lint by 2 or 3 to 1, throughout the entire period of boll development. Oil in the seeds, up to 5 weeks after blossoming, amounts to only about 2 or 3 percent of the dry weight, and then increases rapidly, reaching 10 percent by the 6th week, and 25 percent in 9 weeks. Percentage of unsaponifiable matter in the oil decreases from 45 to 14 percent during the 3d to 5th weeks after blossoming, and then drops rapidly as the seeds mature. Free fatty acids begin to decrease rapidly after the 4th week. Iodine value increases from 102.5 at 3 weeks to 114.67 at seed maturity, 60 days after the blossom opens.

During the ripening period, protein content increased from 16.1 to 20.6 percent, and at a fairly uniform rate. In weight per 100 bolls, the increase was accelerating, going from 5.3 percent at 3 weeks to 48.5 percent after 51 days. Carbohydrates, on the other hand, remained fairly constant in percentage until the 5th week, then fell off rapidly as the oil content increased, suggesting that carbohydrates were being converted into oil.

The Halphen reaction on the oils was negative up to 51st day, and then became weakly positive, increasing to a very strong reaction when the seeds were fully mature.

Digest from "Changes in Composition of Cottonseed During Development and Ripening," by D. N. Grindley, *Journal of the Science of Food and Agriculture*, Vol. 1, No. 5, 147-51, May, 1950.

—*End*

"Rolling Control" of Quality

—*Continued from page* 154

laboratory also renders additional assistance in unusual analyses, and research in various pertinent lines.

Production School

Because education is a vital part of quality control, the company supplements its traveling laboratories with a broad program of training for bottling plant production personnel. To the Production School, regularly held in Atlanta, come men from all parts of the United States, as well as foreign countries. They spend two weeks learning the fine points of operation and maintenance of bottling equipment.

Since water treatment is probably the least understood phase of the bottling operation, considerable emphasis is placed on this subject. To clarify the operation, a demonstration unit made entirely of Plexiglas is employed. It was designed to deliver 0.4 gal. of water per minute with a 2-hr. retention time. The action of coagulation, the movement of slurry as it circulates, control of sludge removal, and the effect of adequate and inadequate backwash rates are all lucidly illustrated before the eyes of the men who will be responsible for water treatment in their individual plants.

Since its inception in 1945, the Production School has conducted 35 sessions, conferring diplomas on more than 1,000 graduates from domestic bottling plants, company agencies, and overseas plants.

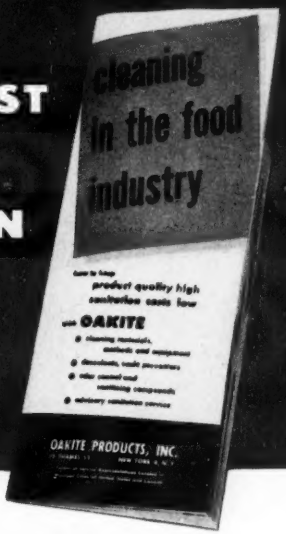
To reach additional plant employees, on-the-job training is offered. The Production Clinic, with sessions sponsored by the Parent Bottlers and with aid from the traveling laboratory personnel, digests production efficiency in short meetings. Production films that dramatize the importance of a quality product and review production from beginning to end, are made available to the bottlers' organization meetings. There is also the *Production Handbook* that gives bottlers a body of essential information in quick-reference form. A quality control "center" (laboratory table incorporating equipment and test procedures for day-to-day control over plant operations) has been developed for bottlers.

The whole quality control plan, carried on cooperatively by the company and the parent bottlers, is further reinforced by special activities of the latter, who likewise maintain production organizations working intimately with the bottlers in their territories. All these efforts are closely coordinated.

Results of this integrated quality control program are evidenced by

Free Guide

TO LOW-COST SANITATION



How to

- Clean kettles, cookers, fillers, smokehouses, refrigerated trucks, etc.
- Control bacteria, mold, slime, algae, odors.
- Lubricate conveyor chains.
- Remove rust and scale from equipment and water-circulating systems.

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the company's exceptional success in the carbonated beverage field. Particularly, the constant careful control by the mobile laboratories has worked to give the words, "You taste its quality," true meaning.

End (*Resume reading on page* 66)

Raw Material Inspection

—*Continued from page* 93

to the processor: "We are here to discuss the single subject of your having used a contaminated raw material to produce a contaminated finished product, which you have moved in interstate commerce. There is no question of the sanitary condition of the operating plant, since it has been found by the inspector to be in a satisfactory condition."

The Federal Inspector had observed the plant using contaminated raw materials, and he found the same contamination in finished products offered for sale in interstate commerce.

If you will put yourself in this position, you will readily see the importance of adequately inspecting raw material on arrival at your plant and keeping a record of the inspection. This may sound like an expensive, time-consuming procedure. But we believe that when you evaluate the situation, you will find that it isn't.

You have, say, a receiving sheet for reporting receipt of materials. So, in order to determine that the shipment is in accordance with quantity ordered, it is necessary to count the packages or weigh the product. At the same time, it is a simple matter to make a visual examination of the product, and the addition of a few lines to your receiving sheet is all that is necessary for reporting such an examination.

Setting Up a Laboratory Method

Of course, the person making the examination must have a certain background of knowledge, know what he is looking for, and how to look for it. It is likely that he will need certain pieces of equipment to assist him, depending upon the commodity involved. It should not consume a large amount of time to take a composite sample of the material for carrying out a laboratory extraneous-matter analysis, or other type of test.

It is not being suggested that an inordinate amount of time be given to these examinations. True enough, you should work out a reasonable procedure for each commodity. And you should operate upon the principle of sufficient examination to establish the reliability of the supplier, following up with sufficient re-examination to confirm his continued reliability. However, prac-

tice will result in a procedure and policy not excessively expensive or time-consuming.

As you go along in your sanitation program, you will see the necessity of examining finished products for contamination. If the results show contamination far in excess of any contribution that could be expected from raw products, it may be assumed that contamination is taking place in the plant, or that there is some error in the examination procedure. Perhaps a minor raw material, given little attention, is to blame.

Sufficient Storage Facilities

Occasionally, a food processor uses an unsatisfactory raw material and offers the excuse that it had to be accepted because he was out of supplies when it arrived. Consequently, it was either a matter of accepting an unsatisfactory product for processing, or of shutting down the plant. If this situation exists, the entire procedure of sanitary practices in relation to purchasing and receiving is nullified.

But such a problem can be solved by studying storage facilities and purchasing procedure and then making necessary adjustments providing the capacity whereby rejection of a contaminated lot of raw material may be permitted without interfering with plant production.

Re-Conditioning Raw Material

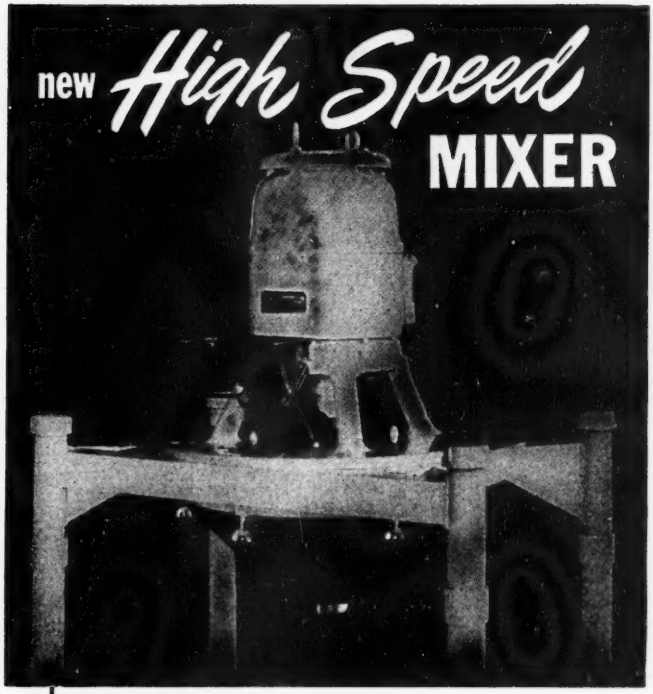
There is also bound to arise, at some time or another, the question of cleaning or re-conditioning contaminated material.

You must use extreme caution in undertaking this practice. Do not let your supplier mislead you, for acceptable procedures for removing contamination from food products are highly limited. Your cleaning may restore appearance without removing contamination.

Also, you must exercise great caution in accepting or processing materials which have been contaminated, then re-conditioned prior to reaching your plant. Check the materials to make sure that the method used was acceptable, and that it has been properly carried out.

You must constantly keep in mind the fact that you cannot expect to produce a sanitary finished product, reasonably free from contamination, if you use unsanitary, contaminated raw material. Indoctrinate your purchasing and receiving personnel in the principles of preventive sanitation.

Also, keep records of as much of your procedure as possible, so that you are always in a position to demonstrate to a complaining customer, or to a law-enforcing agency, the fact that every



Improves Food Processing

BATCH OR CONTINUOUS MIXING

Homogeneous mixing is now obtainable for food products in faster time . . . at less cost . . . with the "ENTOLETER" Mixer. Amazing savings have been effected in processing time. One company has been able to reduce its mixing cycle from 2 hours to ½ hour.

The saving in mixing time is usually accompanied by a smoother, more intimate mix, permitting improvement in product quality. The high-speed centrifugal action thoroughly disperses materials, producing a remarkably smooth textured product.

The "ENTOLETER" Mixer requires only 12 cu. ft., with capacity of 12,000 lbs. of finished mix per hour. This equipment destroys all stages of insect life where beetle or similar insect infestation may be present. Mail coupon today.

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The Safety Car Heating & Lighting Co., Inc.
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Please send bulletin describing the "ENTOLETER" High-Speed Mixer

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Company.....

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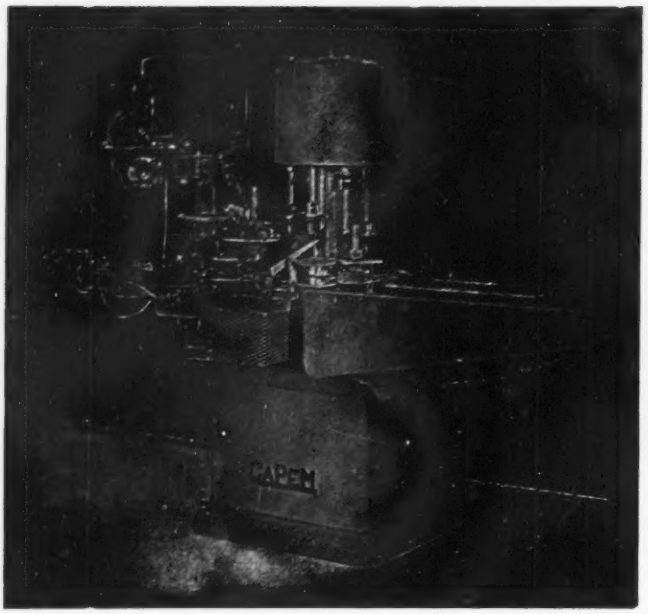
CAPEM

THE MODERN SCREW CAPPER



- Applies any type of standard screw cap or cover at speeds of 2000 to 10000 per hour.
- Takes container from conveyor line, applies cap perfectly, and returns container to conveyor AUTOMATICALLY without intermediate handling.
- Handles bottles, jars, cans or jugs of any size or shape.
- Delivers a perfect, LEAKPROOF seal at low cost.
- Available in 1, 2, 4, 6 and 8 spindle models.

Write for prices and delivery.

CONSOLIDATED PACKAGING MACHINERY CORP.
BUFFALO 13, N.Y.

reasonable precaution has been taken by you in preventing the acceptance and use in your plant of unsanitary materials.

The development of a sanitary procedure in connection with purchasing and receiving of raw materials, is the first, and one of the most important steps in the development of a sanitary plant that produces a sanitary finished product.

End (*Resume reading on page* 94)

Flexible D.C. Drives

—*Continued from page* 102

Individual drives mean separate motors for each section, so that the load on any one motor is a direct indication of mechanical load on the particular section it drives. If the driven section is out of adjustment or is in need of lubrication, there will be a load change on that motor. Immediately the operator or maintenance man is warned of approaching trouble. Machine damages and production losses are anticipated and avoided—in short, preventive maintenance is simplified.

Individual drives provide for the jogging or inching speeds advantageous to getting a processing run lined up and started. Further, they are easily adapted to control by selected groups—singly, groups of two, groups of three, etc. The importance of this kind of control—coordinated control—is evident in, say, a machine cutting out crackers from the continuous sheet it receives from the finishing and gage rolls.

The cutting head speed must be independently adjustable in order to utilize the dough sheet to the fullest. But in adjusting the speed of the final apron to place the base cake on the oven band, the operator wants the cutting head, finishing rolls, and all other drives ahead, to change *proportionately* in order to maintain their proper relationship and not upset the adjustments he has already made.

Electronic drives have been tried and proven as an excellent means of obtaining adjustable speed in nearly all industries. They are particularly suitable for the food industry because of the outstanding cleanliness achieved. Only the motor is mounted at the machine. The control equipment can be installed away from the machine.

Thus in the bakery this equipment can be in a location free from flour and dough scrap, where its maintenance is entirely separate from the every day maintenance of the conveyors, rolls, aprons, and the like. The motors can be conveniently located to one side of the machine, keeping the

(*Turn to page* 173)

Bright and shiny AT DAY'S END...

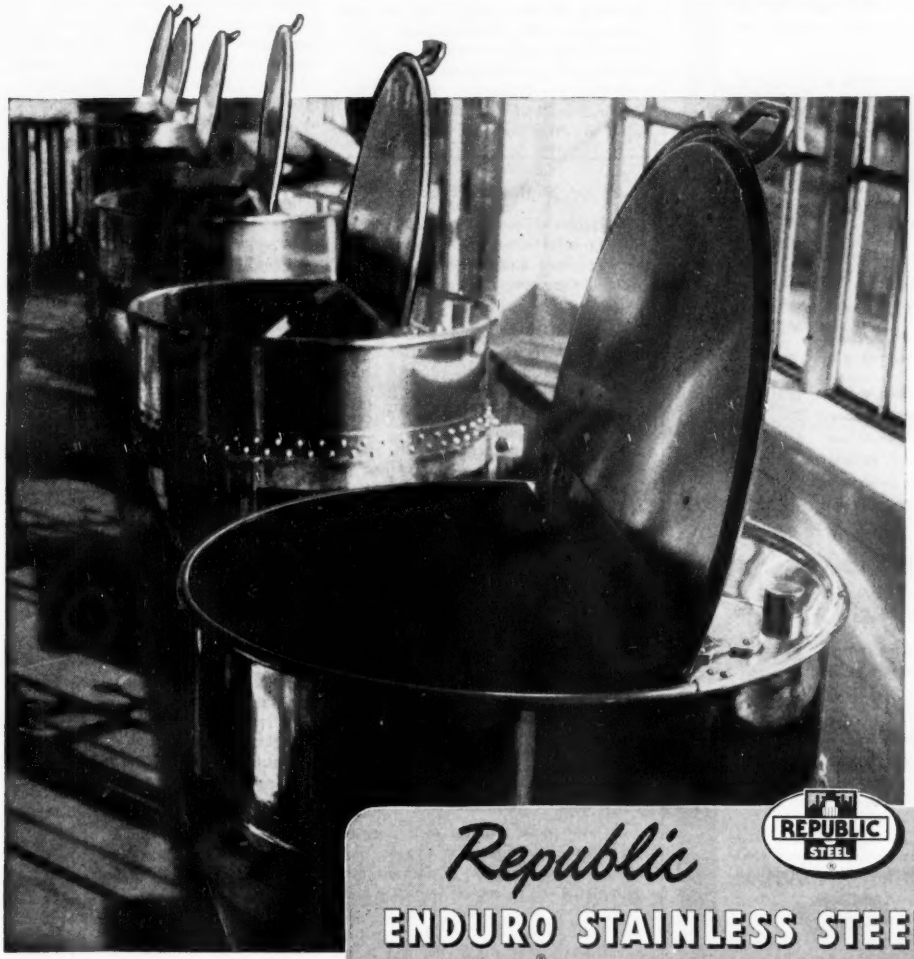
Bright as a new dime . . . and easy to keep that way—that's food processing equipment made of Republic ENDURO Stainless Steel.

With ENDURO, it's simple to start each batch in sparkling clean equipment . . . to switch from one product to another fast . . . as in this preserve and jelly packing plant. Between runs, the ENDURO kettles are merely rinsed with warm water. Even hard-to-handle stains—such as grape—flush away. No hard scrubbing. No danger of contaminating later batches.

In ten years, these 30-gallon ENDURO kettles have required no maintenance. Yet at the end of each day, they're bright and shiny as new. ENDURO lasts . . . saves other critical materials.

Your own present ENDURO equipment, with reasonable care, will see you productively through the years ahead. For suggestions on its care, and for the answers to any questions about it, write:

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.



Other Republic Products include Ex-L-ite Tin Plate, Pipe, Sheets, Bolts and Nuts, Electrunite Tubing, Niles Barrels and Drums

KLENZADE

COMPLETE PROGRAM

For Food Plant Sanitation

Save pay-roll hours by streamlining your clean-up operations and using more effective lower-cost-per-job cleaners, detergents, and bactericides. Eliminate waste materials and unnecessary effort. A Klenzade field technician will help you plan a complete integrated program.

KLENZADE HC-6 Cleaner

Scientifically balanced high-efficiency soapless cleaner Contains wetting agents and special polyphosphates for general cleaning. Softens hardest water.

STER-KLEEN KLENZADE LC-112

Fast-working organic acid detergent compatible with all quaternaries. Removes lime film on stainless steel, glass, tables, etc.

STER-BAC KLENZADE S-12

Outstanding powerful quaternary. Sustained bactericidal action. For deodorizing and disinfecting in food plants.

44 Branch Offices and Warehouses

Write us about Klenzade Field Technical Services and plant cleaning programs. No obligation.

KLENZADE

KLENZADE PRODUCTS, Inc.

BELOIT, WISCONSIN

Questions & Answers

How Would You Do It?

Readers are invited to submit to FOOD ENGINEERING answers to questions in this department, especially to "This Month's Problem." Selected answers will be published, with credit (unless you specify otherwise). We pay space rates.

What Is Your Problem?

Subscribers also are invited to send in food engineering questions. We undertake to provide answers, free, to the best of our ability. We do not undertake costly investigations. Give full information and your name. Your identity will not be disclosed.

Write to Questions & Answers Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 18, N. Y.

Can for High-Salt Product?

Question—We are interested in obtaining information on a coating for tin cans—one that will make the cans suitable for packing soya sauce with an 18 percent salt content.

Answer—To our knowledge, there are no suitably coated cans which will prevent the salt in your product from corroding the container. Once the can of sauce is opened, air enters it and then corrosion starts.

Since the container you seek must resist corrosion by salt and since it must be re-used by the consumer after it is opened, why don't you consider packing your sauce in glass?

Color Fading In Candies

Question—We are up against a problem that we've been unable to lick—color fading in our bon bons. We have experimented with colors from various sources, and still the bon bons fade. Can you help us?

Answer—You are up against a problem that is relatively easy to solve. Your bon bons are dehydrating or drying out, and as a result the sugar crystallizes.

To stop color fading, we'd suggest that there be added a hygroscopic agent which, unlike moisture-losing granulated sugar, retains moisture and does not permit fading. You'll find that with addition of a hygroscopic agent like invert sugar, the bon bons will remain soft and moist and they will not turn pale during the time they are on display.

We do know that some candy makers use glycerin to check sugar crystallization and subsequent color fading. The amount of glycerine is believed to be in the 1-3 percent range.

About Control Accuracy

Question—Executives at my plant insist on a smooth, non-varying 24-hr. chart record for each process operation. Does this always mean, as they believe, that process control has been perfect?

Answer—Not necessarily. A smooth chart record reflects the *sensitivity* of a recording instrument as well as lack of variations in the process. Enclosing a thermometer bulb in a heavy stainless-steel well, for example, can cut down instrument response to the point where process fluctuations are just not picked up on the record.

We have seen cases of this type—where plant personnel have knowingly or unknowingly retarded instrument action to get a pleasing record. They are just kidding themselves. Usually, a few irregularities in the record indicate that it is reflecting *true* process values in dynamic fashion.

Blocking Heat From Sun

Question—In one of our branch warehouses, the heat comes through the windows on one side and makes the warehouse very hot in summer. The landlord will not permit us to put up awnings to keep out the sun, and he will not install glass block panels, double-pane windows or actinic glass. —How can we reduce the heat from the windows?

Answer—An inexpensive solution to this problem, and one found satisfactory by some food processors, is to paint the glass in the windows with a specially made "actinic" paint. A coating of this material on the glass provides a translucent blue film which acts much like the actinic glass. That is, it transmits a satisfactory amount of light but filters out heat rays and reduces the temperature inside the building appreciably.

This Month's Problem

Question—We've received a number of complaints from consumers on the condition of our frozen hake fillets. In general, the consumers found the fillets dry, stringy in texture, and very coarse. Some declared that the fillets, after they were fried, shrunk to about one-third their original size. Can you tell us what has happened?

Flexible D.C. Drives

—*Continued from page* 170

area under the machine open and easy to clean. Handling and cleaning of the working elements are considerably simplified.

D.C. Drive Installations Increase

Most flexible and best suited for adjustable speed is the d.c. motor. The percentage of d.c. drives compared to a.c. drives installed annually throughout all industry continues to increase, as it has in the past 30 years. This drive can handle many speed problems that cannot be accommodated by a.c. machines or mechanical devices. It is the most suitable for wide speed ranges and especially for sectionalized drives where "coordination" of the section speeds is required.

Speed of the d.c. motor can be adjusted by change in armature voltage or by changes in shunt field voltage. By combination of the two, it is possible to cover speed ranges of 50/1 and higher. Ordinary a.c. motors do not have the flexibility and performance characteristics necessary for bakery drives.

Granted, a.c. power is predominant throughout industry—but it is no obstacle to the use of d.c. drives. Adjustable voltage d.c. power is readily provided by systems such as the Ward Leonard motor generator sets or, as stated earlier, the electronic d.c. motor drives.

As pointed out, the latter were developed about ten years ago and since then have been successfully employed in thousands of adjustable-speed applications. It is a versatile drive and has high performance characteristics. For any speed setting there will be only a negligible change in speed as the load swings from no load to full load. Torque (or current) limit is provided and is adjustable so that only a limited amount of torque is applied to driven equipment when it stalls, jams, or is overloaded.

Pre-Set Speed Is Natural

This feature protects the driven machine. Pre-set speed is natural to the design. With the adjusting dial set for a given speed, the drive will come up to this speed each time it is started. Dynamic braking is provided—the drive coming very quickly to a halt when the stop button is pressed or the overload relays trip.

Furthermore, the drive is standardized equipment. It is stocked by manufacturers in common horsepower ratings and available as standard for a wide variety of combinations of horsepower, motor speeds, and gearing: These features are available in electronic motor drives at reasonable cost.

The electronic d.c. motor drive (Fig. 3) has four main parts: (1) Anode transformer, (2) electronic control panel, (3) d.c. drive motor, and (4) operators control station. Power (a.c.) is brought into the anode transformer. The transformer windings provide supply voltage for the control tubes, power for the motor armature circuit through the larger, armature circuit tubes, and power for the motor field circuit through the smaller, field circuit tubes.

The grid-controlled tubes, called thyratrons, for armature and field circuits are gas-filled. These tubes convert the a.c. power to d.c., and by control of their grids, the d.c. voltage is made adjustable. The vacuum tubes of the brain circuits provide for the grid control function, thereby effecting torque limit, regulation of armature voltage or speed, pre-set speed, etc.

In cases where control of the motor field voltage is unnecessary (drive speed ranges of 20/1 or less) the field circuit tubes (phanotrons) are not grid controlled, but merely supply constant field voltage.

As mentioned before, "coordination", or selected group control of a number of drives from remote positions, is easily arranged. An electronic coordinating panel has been developed which will perform this function. At the time of installation, panel connections can be made to control the drives in a number of convenient combinations.

End (*Resume reading on page* 102)

Materials Picture Dims

—*Continued from page* 137

favored applicant advance. In most instances this is quite impracticable.

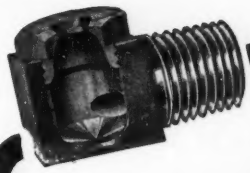
Food Industry and CMP

CMP undoubtedly will be started for military requirements by July 1, 1951. This has dire import for the food industry. It will allocate to various defense agencies needed supplies of materials and facilities. And in theory at least, none of this material will be available to civilian industries which are now being helped by the DO rating system.

Theoretically, the remaining supplies available are all to civilian industries. Already, allocations are being made, such as: For manufacture of certain farm machinery; aluminum (49,000,000 lb.) for conductors for electric utilities; iron and steel scrap on basis of essentiality; tin on basis of essentiality; cattle hides, calfskins and kips; a long list of chemicals;

(*Turn to page* 176)

LESS CLOGGING WITH MONARCH



In many Food Processing plants Monarch Spray Nozzles are used to . . . .

Wax Fruits
Rinse Vegetables
Powder Milk
Dry Eggs
Wash Filter Cake
Humidify
Banana Rooms

Remember

if the liquid can be sprayed with direct pressure Monarch can furnish the Nozzles.

Send for Catalogs 6 A and 6 C

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ATTRACTIVE PACKAGES! It's easy to produce neat, eye-appealing packages—so important in product merchandising today—when you use Union Special's *Style 60000D* machine to close small paper bags with the exclusive *"Dubl-Tape"* sewed closure.

CAPITALIZE ON THESE FEATURES! Machines are especially designed to help you solve your packaging problems:

- **FAST**—keyed to output of standard filling and weighing equipment.
- **VERSATILE**—conveyor adjustable for various bag sizes. Efficient on short or long runs.
- **ECONOMICAL**—requires only a modest investment. Uses inexpensive cotton thread and paper tape.
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- **SEMI-AUTOMATIC OR AUTOMATIC**—for use with one operator or part of a completely automatic installation.

Send for your COPY!

• **BULLETIN ON REQUEST.** Bulletin No. 100 shows how food packers are making profitable use of this machine and how you, too, can use it for closing small paper bags.

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Useful New Books & Government Publications

How Refrigerating Machinery and Equipment Is Applied in Freezing and Storage

REFRIGERATING DATA BOOK, APPLICATIONS VOLUME. *3d Edition. Published by American Society of Refrigeration Engineers, 40 W. 40th St., New York 18, N. Y.,* 1951. 894 *pages;* 6½x9½ *in.; cloth. Price,* $6.

Well over half of this third edition of ASRE's applications series is devoted to some aspect of the food industry. Included are quick freezing, refrigeration in food manufacturing and distribution, and cold storage.

In detail, these chapters cover about every class of foods that can be commercially frozen. The art and science of freezing, as well as the proper application of refrigeration machinery and associated equipment in solving user's problems, are thoroughly discussed.

As in recent editions, the book is divided into major sections, each handled by an associate editor who is a specialist in the field. Chapter authors provide the actual material making up the sections. Among the associate editors in this volume are: Gerald A. Fitzgerald, Bernard E. Proctor, George A. Hayner, Durward F. Fisher and Wilbur T. Pentzer.

It has not been found necessary to completely rewrite the second edition, which appeared in 1946. There has been revision where necessary, of course, and new chapters include: Packaging of Frozen Foods, Frozen Fruit Juice Concentrates, Refrigerated Storage of Dehydrated Fruits and Vegetables, and Properties of Metals at Low Temperatures.

F&DA Reports

FEDERAL FOOD, DRUG, AND COSMETIC LAW ADMINISTRATIVE REPORTS—1907–1949. *Published by Commerce Clearing House, Inc., 214 So. Michigan Ave., Chicago, Ill.,* 1951. 1,446 *pages;* 6¾x10 *in.; cloth. Price,* $20.

Here is an indexed compilation of official reports of the Food and Drug Administration that were issued from the agency's beginning in 1907 to the end of 1949. It is the first time these reports have been brought together in one place and provides a much needed source for this important information.

The book marks the first step in the proposed publishing program of the Food Law Institute, the group organized in 1949 by leading food manufacturers to clarify and compile studies, as well as formulate instructions in the food law.

Professional Data

THE ENGINEERING PROFESSION, *2nd Edition. By Theodore Jesse Hoover and John Charles Lounsbury Fish. Published by Stanford University Press, Stanford, Calif.,* 1951. 486 *pages;* 6½x9¼ *in.; cloth. Price* $7.50.

Like the first edition, published ten years ago, this book describes the qualifications and duties of the professional engineer and the engineer's approach to his profession. The aim of the authors has been to offer objective data through which any professional engineer might appraise his own qualities and capacities for future development. Addressed to all branches of the profession, there is naturally little that is specific to any particular branch.

Thirty-nine tables picturing such widely divergent aspects as salaries and the functional, industrial and geographic distribution of engineers provide illuminating data, particularly for the younger men in the profession.

Separate Volume

THE ENGINEERING METHOD. *By John Charles Lounsbury Fish. Published by Stanford University Press, Stanford, Calif.,* 1951. 186 *pages;* 6¼x9¼ *in.; cloth. Price,* $3.

This book presents in a separate volume three of the chapters included in "The Engineering Profession." Among the reasons offered for separate publication is the facilitation of its circulation among engineers and engineering assistants, "for whom it should serve as a sort of 'rules of the game' of problem solving and a powerful aid in acquiring the comprehensive understanding required for most effective teamwork."

It is also anticipated that experienced engineers and non-engineers might find the book of value in exami-

ning and comparing their own methods of solving problems with the approach as described here.

Good Jam Book

JAM MANUFACTURE. *By George H. Rauch. Published by Leonard Hill, Ltd., 17 Stratford Place, W. 1, London, Eng.,* 1950. *210 pages; 5½x8¾ in.; cloth. Price,* 20s.

It seems highly proper that such a complete book on the production of jam should come from England. Having been producing such products longer and on a greater scale than any other country, the English should know a great deal about it.

For so small a book, it is surprisingly comprehensive. It follows jam making from selection of factory sites to formulas and bottling. Its pages on gel formation, pectin, sugar, glucose, acidity, and colors are particularly enlightening. There is also a short but intriguing chapter on failures in jam making.

The book is well illustrated with both plant and equipment pictures, and there is a conveniently condensed chart on legal regulations, touching jams, in countries throughout the world.

Government Publications

GAUGING MANUAL. *General Services Administration. Price for cloth-bound volume,* $2.00. This publication embraces instructions and tables for determining the quantity of distilled spirits by proof and weight.

U. S. IMPORT DUTIES 1950, *United States Tariff Commission. Supplement I to the* 1950 *volume.* Shows changes made during the year 1950.

These recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, *D. C. When no price is indicated, the pamphlet is free and should be ordered from the bureau responsible for its issue.*

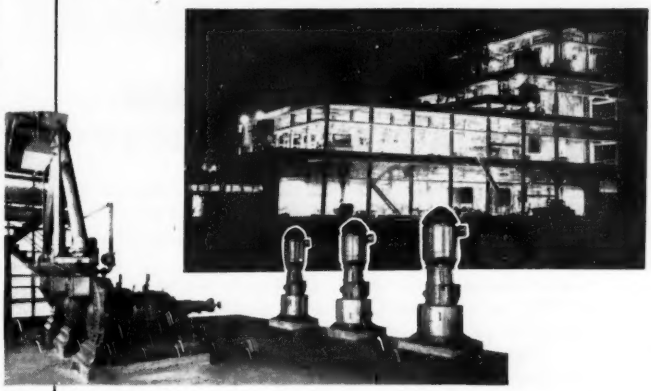
COMPETITIVE POSITION OF CHICKEN AND EGG PRODUCTION IN THE UNITED STATES, *by Raymond P. Christensen and Ronald L. Mighell. Department of Agriculture, Washington, D. C., Technical Bulletin* 1018. *Price* 20c.

CHEMISTRY, PHARMACOLOGY, AND CLINICAL APPLICATION OF RUTIN. *By J. F. Couch, et al. Eastern Regional Research Laboratory, Philadelphia* 18, *AIC-291. Mimeographed.* —*End*

New CORN PRODUCTS PLANT MODERNIZES STARCH and SUGAR PRODUCTION

The "Bluebonnet" plant at Corpus Christi, Tex., *made headlines*—not only because of its unique wall-less construction. Of even greater interest to the process industry are the much improved, continuous methods used to transform Milo Maize into starch and sugar. The engineers of Corn Products Refining Company broke with tradition—sought and found a *better way* to make starch!

Here, the old conventional stone-type buhr mill was replaced with modern-day *degerminating mills, disintegrators,* and *repulpers* . . . all specially equipped for starch processing.



At Corpus Christi, six Sprout-Waldron 36″ single disc degerminating mills handle the full plant load of incoming grain, freeing the germ from the kernel without crushing it. After separation, three disintegrators and two SW 36″ double disc repulpers take over and together do a job that formerly required six buhr mills, moisture expellers, and a three-stage coarse fiber washing station to get the same results.

Engineers of the "Bluebonnet" plant point out that the use of Sprout-Waldron repulpers, in combination with disintegrators, improves the recovery of starch, decreases maintenance costs, and requires considerably less floor space than previous methods.

Why not bring your size reduction problems to Sprout-Waldron? Our broad experience may be helpful to you, too! Write Sprout, Waldron & Co., Inc., 35 Waldron St., Muncy, Pa.

LOOK TO SPROUT-WALDRON for BETTER PROCESSING EQUIPMENT

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Manufacturing Engineers
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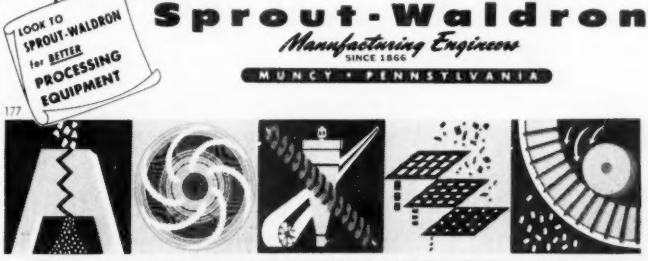
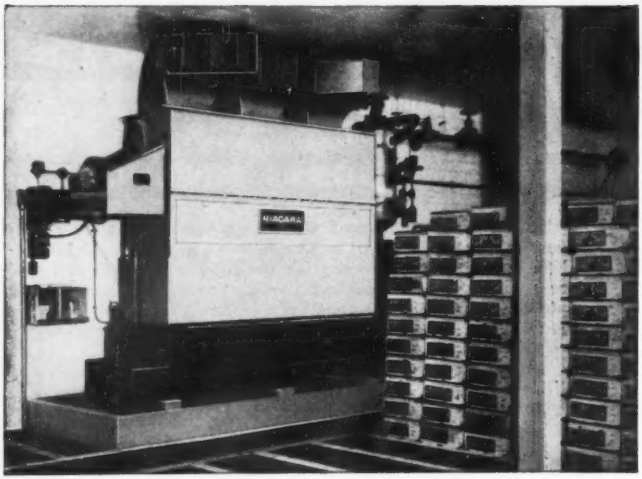




TEMPERATURES NEVER RISE... with NIAGARA "NO-FROST"

● With the Niagara "No-Frost" Method, your refrigerating operation is never interrupted for defrosting since at no time is there ever any accumulation of ice or frost on the coils of the Niagara "No-Frost" Spray Cooler.

If you are *pre-cooling*, the full capacity is always there to handle the "live load" and you get quicker chilling of your product to the core with no rise in temperature at any time. If you are *freezing*, the process is continuous and faster, and you get more production. If you are *holding* fresh or frozen food, there is never any temperature rise to endanger the quality.

The Niagara "No-Frost" Method saves money in its operation. A user recently said: "We added a new freezing room to our plant without any additional cost for power". This was accomplished because the Niagara Aeropass Condenser held the head pressure down to the minimum for the entire plant, while the Niagara "No-Frost" Spray Cooler operated at higher suction pressure.

Write for Niagara "No-Frost" Bulletin 105 and details of operation for the type of refrigeration in which you are interested.

NIAGARA BLOWER COMPANY

Over 35 Years of Service in Industrial Air Engineering

Dept. F. I., 405 Lexington Ave. New York 17, N. Y.

District Engineers in Principal Cities

INDUSTRIAL COOLING HEATING • DRYING

NIAGARA

HUMIDIFYING • AIR ENGINEERING EQUIPMENT

Materials Picture Dims

—*Continued from page* 173

tungsten; columbium and tantalum.

The list is growing day by day.

Impact On the Food Industry

In many instances, the civilian supply of legitimate materials and facilities has dried up completely. Even a DO rating will not help unless one can find a supplier able to accept it.

The dairy industry is the first to be badly hurt. Supplies of milk cans will be very inadequate, and much milk will be wasted unless the unexpected happens.

Judging from the relatively few cases of hardship applications received from other food processors, adequate shelf supplies were available in the first quarter. But processors in several branches of the industry were finding the going rough early in April.

What Is Being Done About It

To head off the chaos which could occur when CMP goes in to effect, all agencies responsible for claiming materials and facilities for civilian industries have been working out their own controlled materials plans. And the Department of Agriculture is expected to request an allocation of steel for the food processing industries beginning the third quarter, July 1, 1951. Later on, additional requirements programs can be added.

It is evident, however, that there will be an overall belt tightening. And the share any food industry can expect to receive will be based on the relative essentiality of that industry in competition with all other food industries. There are dozens of food industries which may have to get back on a wartime basis in order to exist.

Importance of Essentiality

There are many points about a number of food products which are not readily apparent at first glance. Nutritionally, many would rate very high. But they may not be considered essential in comparison with basic foods such as bread and milk. So the industry which is smart will do something about working up data to present to the USDA to bring out important points of essentiality.

Data Needed Immediately

The USDA needs data to do its job for the food industry. Some associations of equipment manufacturers already have submitted production and usage figures. All other associations should do the same. They should give whatever data is available now for

(*Turn to page* 179)

..a **MUIRSON** *Specialty!*

Scuff Resistant.. Heat Resistant *Varnished* Wraps and Labels

All four of these well known products faced difficult packaging problems involving heat blocking and scuffing. Muirson-developed wraps and labels have successfully answered these problems with inks and varnishes which not only give the packages a clean, bright appearance on the grocer's shelf but also achieve maximum efficiency in wrapping and labelling machines.

Perhaps your product could profitably use scuff-resistant, heat resistant wraps and labels.

A Muirson representative will gladly supply you with full details. Write to the nearest factory.

Better color, better service, better labels...because

MUIRSON specializes in **LABELS**

This page was prepared and produced in its entirety by MUIRSON LABEL CO., INC. Complete plants in San Jose, Calif., Peoria, Ill., Meriden, Conn.

Here's Why it Pays You to Read the Advertising

The advertising is a rich source of valuable information. In this magazine it offers you ideas and products that may well apply advantageously to your business.

Every issue is a catalog of goods, materials, and services – quickly available to you – just for the reading.

Leaders in business and industry turn to the advertising because they've discovered it helps them run their businesses more profitably.

When you read all the ads in this magazine, the chances are good that you'll get a lead that will materially help you do a better job. For example, you may find a specific piece of equipment that will be a profitable time-saver. Or a tool that will increase worker efficiency. That's why it pays to read the advertising. It's good business.

McGRAW-HILL
publications

Materials Picture Dims

—*Continued from page* 176

steel, then supplement this later with better data, along with data on copper and aluminum.

These figures should be estimates of requirements for the period July 1, 1951, to June 30, 1952. Figures on iron, carbon steel (including wrought iron), and alloy steel should have been in the USDA Office of Materials & Facilities before May 1. But better late than never. The figures should be submitted in terms of castings, bars, sheets, plates, pipes, wire, rods and structural shapes —but not if this detail delays submission of the data. The actual breakdown can be submitted later.

To avoid duplication, figures should be submitted by associations, rather than individual manufacturers. Where associations do not exist, groups of manufacturers should prepare an estimate for their segment of the industry and explain fully how the data were assembled, the names of manufacturers included, and the portion of the whole which they represent. Where more than one association represents a segment of the food industry, they should get together and submit one set of figures, with full explanation.

Any figures submitted should be accompanied by a statement showing how they were compiled—whether they are based on actual production for 1950, plus an estimated increase for 1951-1952, or what.

End (*Resume reading on page* 139)

How to Set Safety Record

—*Continued from page* 96

thorough check of mechanical condition. No truck or car ever is released from our garages in the morning unless it is in fit condition to be on the streets and highways.

We don't stint. If a car needs new brakes, we put them in. We don't try to get every last mile out of equipment, and then cry when its driver gets into trouble. In the long run our policy pays handsomely.

The operator, of course, is the best judge of his vehicle's condition. And all Blatz drivers are instructed to report even minor difficulties when they return their cars and trucks at night.

The correct schooling of drivers, both of trucks and passenger cars, to insure that they are both capable and safe in their operating habits, also accounts highly for the small number of highway mishaps.

(*Turn to page* 200)

OIL AND GAS BURNING EQUIPMENT FOR EVERY INDUSTRIAL APPLICATION

Whether you burn pitch, tar, oil, gas or a combination of these fuels, there's a NATIONAL AIROIL BURNER for your job.

Our more than 38 years' experience in the design, development and manufacture of all types of industrial burners is at your service.

Ask us about your requirements . . . we'll gladly give you full information.

OIL BURNERS and GAS BURNERS for industrial power, process and heating purposes; STEAM ATOMIZING OIL BURNERS; MOTOR-DRIVEN ROTARY OIL BURNERS; MECHANICAL PRESSURE ATOMIZING OIL BURNERS; LOW AIR PRESSURE OIL BURNERS; GAS BURNERS; COMBINATION GAS and OIL BURNERS; AUTOMATIC OIL BURNERS, for small process furnaces and heating plants; FUEL OIL HEATERS; FUEL OIL PUMPING and HEATING UNITS; FURNACE RELIEF DOORS; AIR INTAKE DOORS; OBSERVATION PORTS; SPECIAL REFRACTORY SHAPES.

TYPE "SA"

(For use where steam is available) *atomizes thoroughly* and *burns completely*, the lowest and cheapest grades of fuel oil and tar, requiring only low oil pressure and temperatures. Send for Bulletin No. 21.

TYPE "S-A-L"

(Large capacity burner similar to TYPE "S-A-R") is adaptable in combination with powdered coal burners in large boilers. Send for Bulletin No. 24.

TYPE "S-A-R"

(Where steam, or gas is available for atomizing) safely and efficiently burns residuums obtained from process. Send for Bulletin No. 23.

COMBINATION GAS AND OIL BURNER

—the "AIROCOOL" Gas Burner in combination with a TYPE "S-A-R" Oil Burner. Send for "AIROCOOL" Brochure.

"AIROCOOL" GAS BURNER

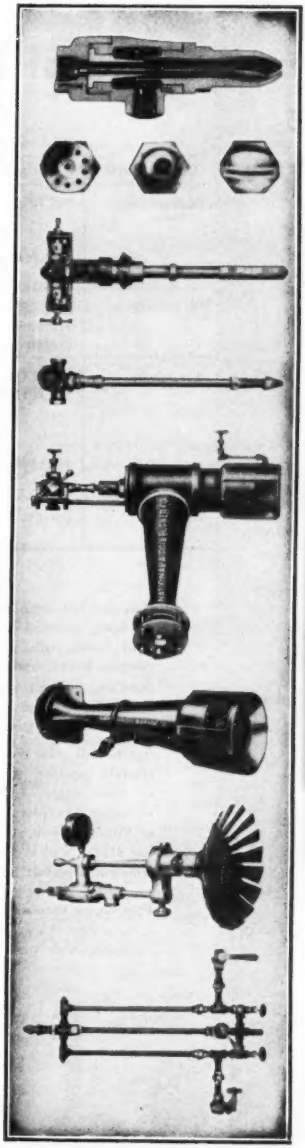
(Of venturi type), assures low turndown without burnback. Send for "AIROCOOL" Brochure.

MECHANICAL PRESSURE ATOMIZING OIL BURNERS

with multi-vane type air diffuser to give a positive swirl to entering combustion air. Send for Bulletin No. 13.

TYPE "S-A-D"

(Refuse Oil Burner) burns acids or caustic oils, sludges, asphalts, tank bottoms, polymer oils, heavy petrolatum, organic oil residuums, waste cutting oils, sulphite pulp liquors, tars, pitches, etc., in combination with fuel oil. Send for Bulletin No. 21.



NATIONAL AIROIL BURNER CO., INC.

Main office & Factory: 1272 EAST SEDGELY AVENUE
PHILADELPHIA 34, PA.

SOUTHWESTERN DIVISION: 2512 SOUTH BOULEVARD
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INDUSTRIAL ENZYMES

Which of These Will Improve Your Products?

Enzyme System	Designation	Availability	Action on Substrate
Pectinolytic	PECTINOL	Commercial	Demethoxylates pectic substances and hydrolyzes them to galacturonic acid. pH range 3.5 - 5.
	Pectinesterase	Experimental	Demethoxylates pectin without hydrolysis of the galacturonic acid chain. pH range 3.5 - 5.
Proteolytic	RHOZYME P-11	Commercial	Hydrolyze proteins to peptides and amino acids. pH ranges 5.5 - 8.5. (Relative amounts of peptides and amino acids will differ for each proteolytic enzyme.)
	Protease 15	Experimental	
	Protease 16	Experimental	
Amylolytic	RHOZYME S	Commercial	Hydrolysis of starch to dextrins, maltose and glucose. Contain both an alpha amylase and a strong glucogenic principle. pH range 5 - 6. RHOZYME S is a purified enzyme; RHOZYME T-22 the crude product.
	RHOZYME T-22	Commercial	
	RHOZYME DX	Commercial	Hydrolysis of starch to dextrins. Heat stable. pH range 5.5 - 6.5.
Lactase	Lactase B	Experimental	Hydrolysis of lactose to glucose and galactose. pH range 6.1 - 7.5.

Commercially available Rohm & Haas enzymes are being used *now* in the following industries:—Fruit juices, jellies and fruit juice concentrates, protein hydrolysates, baking, corn starch industries, fermentation. Have you stopped to think how these materials might improve your product or manufacturing process?

Start with your own natural products which contain pectins, proteins, cellulose, starches or milk sugar. Consider the possibility of changing viscosity, texture, solubility, clarity or filterability of your product at any processing stage. Will the hydrolysis of one of these substrates permit better utilization of others?

Do you want a clearer product—one that filters or presses more readily? Will the end result of hydrolysis be a product that's better utilized, better tasting? Don't forget the possibility of recovering fiber, fat, sugar or protein in waste products.

Whenever you desire mild conditions of hydrolysis, or when you require flexibility in hydrolyzing only one of several components of a natural product, consider Rohm & Haas standardized enzymes. Write us about your problems and ideas. We'll be glad to send you our suggestions, samples, technical literature—or consult with you personally, all without obligation.

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CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

KEEPING UP WITH THE FIELD

Technical News • Washington Highlights • Economic Trends • Labor Developments

"Imitations" Are Real

Some basic principles that have governed Food & Drug Administration in establishment of standards of identity will have to be radically changed. A U. S. Supreme Court decision established that Congress had not specifically authorized F&DA to forbid interstate commerce for a product simply because it resembles a standardized food, but does not meet the legal standard of identity.

Pure Food Manufacturing Co. of Denver made jam of low fruit content, which did not comply with the standards. The legal standing of this commodity, seized in interstate commerce, was in question. In delivering the majority decision of the Court, Justice Frankfurter said in part: "It looks and tastes like jam; it is unequivocally labeled 'imitation jam'. . . . A product so labeled is described with precise accuracy. It neither conveys any ambiguity nor emanates any untrue innuendo. . . ." Unless Congress specifically defines such a food as improper when labeled "imitation", then apparently such seizures by F&DA will not be supported by the courts.

Well-informed leaders of the industry feel that the Court decision may encourage some substantial increase in production of low-grade jam, especially for large institutional container distribution. In that case, the consumer at the table never sees the label and thus the disadvantage of "imitation" largely disappears if the goods are otherwise tasty and wholesome.

Defines "Area of Production"

A new definition of "Area of Production", as used in the Fair Labor Standards Act, has been offered by Henry P. Taylor, Taylor & Caldwell, Walkerton, Va., at the invitation of the Wage & Hour Administrator. Mr. Taylor credits Harold K. Bachelder, at that time president of Ladoga Canning Co., for a statement defining "Area of Production", made at the hearing in April, 1939. Here is the definition:

"Section 536.2 'Area of Production' as used in section 13 (a) (10) of the Fair Labor Standards Act means: That geological territory within which the agricultural or horticultural commodity in question can be, and normally is, grown and delivered, or deliverable, by growers, in its raw or natural state, to the establishment in question for handling, packing, storing, ginning, compressing, pasteurizing, drying, preparing in its raw or natural state, canning for market, or for making cheese, or butter, or other dairy products."

Meat Workers Back Management

Opposition to price controls for meat has spread to organized labor in the meat packing industry, as represented by the Amalgamated Meat Cutters & Butcher Workmen of North America. "Unrealistic ceiling prices," said a union official, "have forced a 60 percent reduction in slaughtering of beef and sheep in some sections of the country."

With a number of meat packers threatened with suspension of all beef and sheep operations, this official foresaw possible cutbacks in union membership of as much as 20 percent. A confused approach to the meat packers' price problem, the union leader said, carries with it the "possibility of wrecking one of the most essential industries in the nation."

Food Chemicals Committee

A standing Committee on Chemicals in Foods has been appointed by the Manufacturing Chemists' Assn. This committee replaces the temporary task committee set up last year to prepare the Association's statement presented before the Delaney Congressional Committee, which is investigating the use of chemicals in foods.

The new committee will concern itself with general industry and legislative problems connected with the safe use of chemicals in foods and will cooperate with government agencies and other organized groups interested in the subject.

No Chlorine for Food

Little support will be given to the use of chlorine in food processing when that aspect of the order comes before the National Production Authority, an NPA official indicated recently.

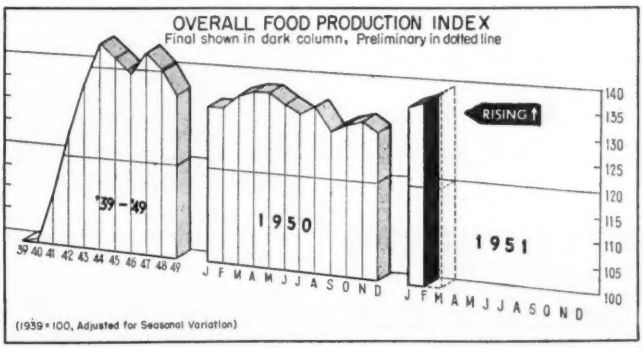
Major purpose of the order (M-31) is to protect waterworks and sewage treatment plants from a shortage of purifying chlorine. The NPA has already ruled that the order does not cover chlorine used in the purification of feed water in public power plants.

Whey for Cheese Spreads

Hydrolyzed whey protein has been developed by Bureau of Dairy Industry as "a product suitable for use in cheese spreads and other foods." Converting low value whey into a new income producer is recommended by the Bureau, which has applied for a public service patent.

In brief, the Department of Agriculture describes the new process as follows:

"Hydrolyzed whey protein is a smooth bland product made from the protein precipitated from cheese whey. The precipitate is converted, or hydrolyzed, by a commercial enzyme into a product of excellent taste that compares favorably with cream cheese in food value. From 4 to 5 lb. of the new product can be made from 100 lb. of whey, and no special equipment is needed for its manufacture in the cheese factory."



Handle **LARGER** Batches

. . . Discharge

AUTOMATICALLY

Now you can do more mixing in less time—with the Worthington-Ransome Rotating-Tilting Pan-Type Mixer.

The drum is not only motor-*rotated* . . . it's also motor-*tilted*. Push-button tilts drum to any angle while rotating —materials discharge *completely*, with no nuisance of scooping.

Capacities up to 3000 lb. reduce handling and re-handling and increase output.

Widely used for coating, coloring, tumbling, polishing and finishing on candies, gum, drug tablets, etc.—mixing powdered milk, relishes, dry gelatin, etc.

Write for Bulletin R-708 on Worthington-Ransome Mixers, built from designs developed from nearly a century of mixer experience.

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RANSOME INDUSTRIAL MIXER DIVISION
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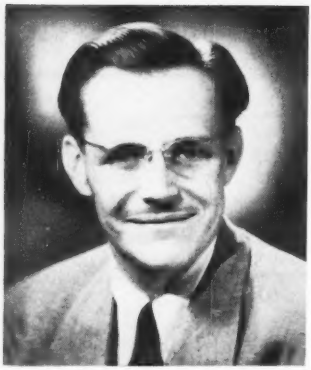


ROBERT T. ANDERSEN

Award Goes to Aseptic Canning

Andersen's Foods, Inc., Santa Barbara, Calif., is the winner of the 1951 Food Engineering Award. Selected by a special Award Committee of the Institute of Food Technologists, the West Coast company was cited for its application of the Martin Aseptic Canning Process in the production of pea soup.

The plaque, presented bi-annually by FOOD ENGINEERING, will be given to Pres. Robert T. Andersen, at the Award Luncheon to be held in conjunction with the 11th annual meeting of IFT at the Hotel New Yorker, June 19.

As was the case with the two previous awards, made to Atlantic Coast Fisheries and Florida Citrus Canners Cooperative, respectively, this third citation is in recognition of an outstanding contribution "to the advance of the industry and profession of food technology made possible through a broader participation by the food technologist in the affairs of the food processing industry."

A description of the prize winning process appears in the February issue of *Food Industries*, now FOOD ENGINEERING, under the title, "Aseptic Canning In Action."

Sweet Opportunity

There is now available an unusual opportunity for utilizing honey as a partial substitute for other sweeteners in making certain classes of manufactured food. The unusual advantage is that honey, diverted from export or low-price usage, gets for its marketer a government bonus. This special price aid is provided for honey which may be sold for new product development.

This may afford a profitable opportunity to try out this special sweetener in novel baked goods, and perhaps in a number of other kinds of manufactured food.

The new honey uses must be persuasively described to the Department of Agriculture in order to be approved for diversion payments.

High Vacuum Dried Foods

Heat-Sensitive foods can be dried under high vacuum with a minimum of flavor change, protein denaturation, nutrient loss, or other adverse effects, according to a report made by Bernard E. Proctor and Robert P. Joslin, of MIT., at the national meeting of the American Chemical Society, in Boston.

When liquid or wet food products are introduced into a sufficiently high vacuum, the report said, they are spontaneously frozen because of the rapid evaporation of water. By maintaining a high vacuum and supplying heat to the frozen material, in the form of infra-red radiations, it is possible to dry the product while it is still frozen. Under these conditions water is vaporized directly from the surface of the ice crystals, leaving a light porous product occupying essentially the same volume as the original frozen material.

Dry cake mixes, dried orange juice and dry wheat gluten were three of food products reported as highly satisfactory.

Better Candy Methods Cited

James A. King, vice-president, Nulomoline Division, American Molasses Co., has been selected to receive the first Stroud Jordan Award by the American Assn. of Candy Technologists. Mr. King was cited for his development of better practical methods in the candy industry and for his many years of practical aid given to members of the industry.

Presentation is slated during the 3rd annual meeting of the association, scheduled for June 5, at the Stevens Hotel, Chicago.

Made possible through the cooperation of the American Sugar Refining Co., the award was established in memory of the late Dr. Stroud Jordan for his contributions to the confectionery industry.

Southern Milk Invading North

Shipments of fluid milk to the north have recently been made by Foremost Dairies, Inc., Jacksonville, Fla.

Furthermore, Foremost president, Paul E. Reinhold, predicts that his company will invade the northern milk markets with frozen concentrated milk, if present research develops as expected. He already foresees twin

packages, one containing frozen orange concentrate, which the company also produces, and the other frozen concentrated milk.

Last year, states Mr. Reinhold, Foremost bought 1,000,000 gallons a week from southern farmers. Even with its growing fluid milk operations, the company has captured a few northern markets in addition to its expansion from Florida through Texas.

Mr. Reinhold points to his company's annual sales, which have increased from less than $1,000,000 ten years ago to over $60,000,000 last year. In the company's early years most of the fluid milk was brought from Minnesota and New England.

IFT Plans Program

Fifteen prominent members of the Institute of Food Technologists will assist Dr. Charles N. Frey and his program committee in the technical organization of the institute's eleventh annual meeting, June 17-21. Each member will prepare papers for a specific topic covering various phases of the food industry.

Freezer Lab in Sight

Creation of a new national low-temperature research laboratory has been recommended by the USDA's Cold Storage Advisory Committee. The lab would work on basic principles of thermodynamics, related fields such as heat transfer, and the effects of ice formation on foods.

Every division of food technology and food storage can profit from some of the specific recommendations, which were: (1) Develop improved and substitute materials for packaging and coating of commodities to be held in cold storage. (2) Develop better methods for freezing and refrigeration of farm products on the farm. (3) Cooperate with other agencies that are studying effects of low temperature environment upon man, particularly the role of nutrition in developing resistance to cold. (4) Investigate the value of preserving seed viability by storage below freezing.

India Gets Synthetic Rice

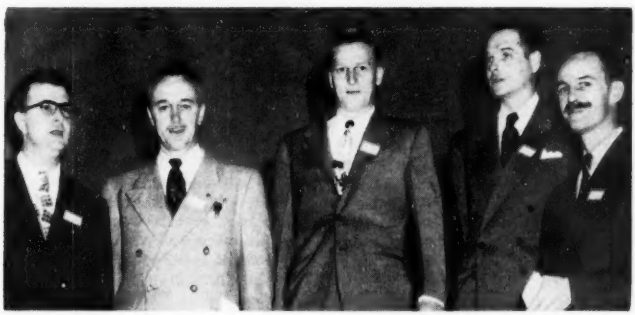
To ease its chronic food shortage, India is considering the manufacture of synthetic rice, according to Sri Prakasa, Minister of Natural Resources.

The main ingredients of the new synthetic food, which will look and taste like natural rice, are to be tapioca flour and groundnut cake. The substitute is said to have a higher caloric value and to be richer in vitamins. Its growth-producing value is also termed higher that that of ordinary rice.

Perhaps the principal advantage of artificial rice for the poor man in India will be its low price—about 4c. per lb, as against 9c. to 15c. for natural rice.

Detect Sucrose Substitutes

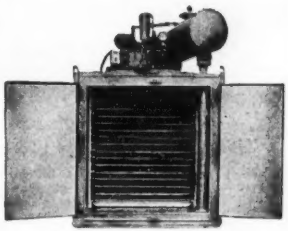
Substitution of enzyme-converted corn syrup for 25 percent of sucrose was detectable in frozen blackberries and frozen raspberries in taste tests reported by Jean F. Caul and L. B. Sjostron., of Arthur D. Little, Inc., at the ACS Boston meeting. The tasters also were able to detect when there was a 25 percent replacement of sucrose with corn syrup solids. And substitutions of regular corn syrup and acid-converted corn syrup (both 10 percent quantities) were likewise spotted.



Battle Food Wastes

These food industry representatives gathered at the third annual Pacific Northwest Industrial Waste Conference to discuss waste handling and control of water and air pollution. From left are: Keith Fenner, quality control manager, Birds Eye-Snider, Hillsboro, Ore.; C. R. Tulley, Northwest Canners Assn.; Helmer Munson, Green Giant Co., Le Sueur, Minn.; A. P. Radebaugh, Green Giant Co., Dayton, Wash.; and F. K. Erickson, State College of Wash.

FROZEN
FOOD PROCESSORS
Here Is The
ONE FREEZER
That Best Meets
ALL
Your Needs!
Amerio
CONTACT PLATE FREEZER
(Patent Applied For)



Model B 15 Station Ammonia Type
Ready For Loading

SPEED
Remarkably Fast
ECONOMY
Low Power Consumption
QUALITY
Full Retention
UNIFORMITY
Flat, Firm Packages
FLEXIBILITY
Various size packages
In the one load.
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AMMONIA BRINE FREON

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Amerio
Contact Plate Freezers Inc.
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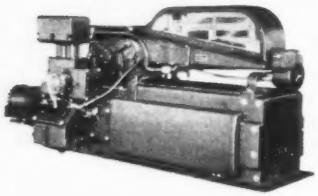
"It's the Contacts that Count"

W&T MERCHEN WEIGH FEEDERS

Give Greater Product Uniformity



Weigh-blending of food ingredients—the only *accurate* way to blend—calls for precision equipment and "know-how".

W&T Merchen Weigh Feeders meet the first of these requirements with these features:

- Feed and weigh in *one* operation
- Handle ounces to hundreds of pounds per minute
- Manual or automatic control
- Easy accessibility
- Handy feed register
- Meet underwriters class II group G specifications

Your W&T Engineer brings you the "know-how" from his experience in designing and supervising hundreds of Merchen Weigh Feeder installations.

Write today or see your W&T Engineer.

M-14

WALLACE & TIERNAN COMPANY, INC.

NEWARK 1, NEW JERSEY · REPRESENTED IN PRINCIPAL CITIES

Food Price Worrier
Michael V. DiSalle, price stabilization director. He is still wrestling with the percentage markup system that is supposed to regulate food prices from the processor through to consumer, while keeping hands off farm prices that don't measure up to the "self-rising" parity. (Wide World)

Cold-Air Tunnel

That moving air in a suitable cold-air tunnel is more efficient and rapid for cooling foodstuffs than conventional cold storage methods, is the conclusion of G. F. Sainsbury, engineer in charge of a series of fruit-precooling tests conducted recently by the U. S. Department of Agriculture.

In one test, boxes of fruit raised on pallets were placed in a tunnel and subjected to blasts of cold air at extreme velocities. Cooling was accomplished 1½ to six times faster than by normal cold storage. In another experiment, cold air directed down into open boxes of fruit resulted in cooling 9 to 10 times faster than was the case under normal refrigeration.

Although applied primarily to fruit cooling, the tests indicated that other foods could be included in this new process.

To Study Absenteeism

Industry is losing more than 10 percent of its available productive man-hours through all forms of absenteeism, according to data gathered by the newly-established National Institute for the Reduction of Industrial Absenteeism.

Executive Director David Bendel Hertz, who is also professor of industrial engineering at Columbia University, thinks that the actual loss has been much greater. And he believes that it is the joint responsibility of management, labor and government to sponsor integrated research in finding a solution.

It is for just this purpose that Niria was set up. The Institute is a non-profit organization and will function on a membership basis to provide an immediate source of data and information on absenteeism.

Relax Tin Can Order

The National Production Authority has relaxed its control over tin to make more of it available for tin can making.

Such a move was necessary because in its endeavor to run off in all directions at the same time the NPA had confused the tin plate makers and the food packers. There are now more than a half dozen orders, amendments, and directives in which effort is made to control the amount of pig tin to be used for tin plate, the thickness of the tin plate for cans for specific food items, and the percentages of pack of canned non-perishable foods permitted this year over last year.

The NPA fell back upon the "hardship clause" to pull itself out of its predicament. Under a "Direction 1" to NPA Order M-25, the federal agency allows food canners to increase their pack in cases where undue hardship would result under present base period provisions as outlined in the original order.

Under the order, the pack of all products except perishable foods is regulated in accordance with the base period pack of such products. The base period is the corresponding quarter of 1949 or 1950. Perishable foods are permitted an unlimited pack, and

no change is made in this provision.

It's the base periods that are giving canners trouble. NPA has therefore permitted all packers to make their own readjustments in specified cases.

In a second action, NPA amended its M-8 order to permit tin plate and terneplate makers to increase temporarily their use of pig tin to 95 percent of their monthly base period use during the second quarter of 1951. Under the previous tin conservation order (M-8) all users of pig tin were restricted to 100 percent in January, and 80 percent in February and March of their base period use.

NPA says this is a temporary, seasonal increase to provide for the canning of perishable foods.

The Agency also ordered another 10 percent reduction in tin cans for beer

(*Turn page*)

Hors d'Oeuvres

• Lexicographers have decreed that you may spell it either "weiner" or "wiener." Wish they could be induced to reach some compromise on the food editors' special headache, "dairy" and "diary".

• *That book extolling blackstrap molasses as a health food may be sold in food stores despite the attempted ban by F&DA. Too bad! It's the kind of book that might have sold well under a ban.*

• *N. Y. Times* says, "Now take this easy: It's Yankee horse sense." Then comes this quote from the inaugural address of Gov. Sherman Adams of N. H.: "I believe if we all would decide this year to give a half a dollar more work for the dollar we receive we would all come pretty near getting back the half a dollar we are losing because our dollars are only worth half as much." Trouble is there are so few horses and so many people.

• *Man from Florida Citrus Commission predicts that California will try to slow the sale of Florida orange concentrate during the summer with a new frozen lemonade mix, "which would aid to a great extent the sale of their summer oranges." If it sounds a little confused, so is the situation.*

• It cost a Toronto company $265,000 tax plus penalties to find out that peanuts and cashews are not fruits, which are exempt from sales tax. For $2 a year they could have learned that FE suspected the non-fruit angle all along.

• *General Foods reports the calculation that the action of 155 tons of Calumet baking powder could lift the Empire State Building 1 ft. off the ground. Just for the hell of it, let's try mixing Calumet and Royal and see what happens.*

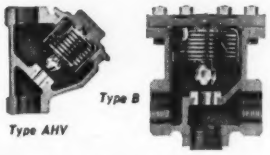
J. A. J. J.

Large Processor Achieves

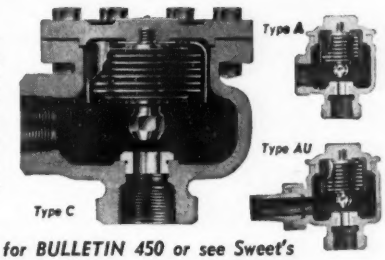
MORE UNIFORM HEATING CYCLES

With Nicholson Steam Traps

The positive action of Nicholson traps was recently used successfully by a chemical maker to smooth out the heating cycles of cookers at 50 to 60 minutes, against previous periods up to 105 minutes. Steam flow was upped to 3000 lbs. an hour against 2000 for the previous mechanical type.



5 TYPES FOR EVERY APPLICATION, process, heat, power. Sizes ¼" to 2"; pressures to 225 lbs. To learn why an increasing number of leading plants are standardizing on Nicholson thermostatic traps . . .



Send for BULLETIN 450 or see Sweet's

W. H. NICHOLSON & CO., 193 Oregon St., Wilkes-Barre, Pa.

Automatic apple bath eliminates hand washing

• All dirt and insecticide sprays must be removed from apples before processing—usually a time-consuming, manual operation. To speed up this step in his plant, a leading processor installed a Cyclone Galvanized Flat Wire Belt equipped with flights. The apples are first dumped into a soak and then removed on the belt—eliminating all necessity for expensive hand-washing operations.

Cyclone's three belt types—Flat Wire, Chain Link and Flex-Grid—are designed to handle various processing problems in food plants. Our experienced engineers will be glad to tell you which belt will best meet your requirements. In the meantime write for a copy of our free catalog #4.

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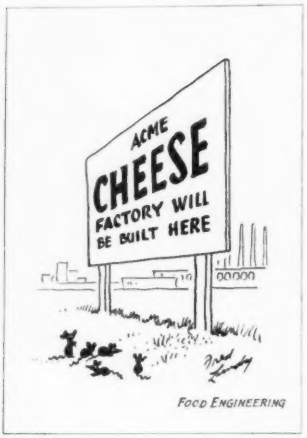

and pet foods. A 15 percent cut in this category had been ordered previously.

A number of foods will get less tin under the changed order. Among them are caviar, baked fruits, spiced fruits, green olives, pie and pastry fruit fillers, bamboo sprouts, onions, white potatoes, scrapple, chicken or turkey a la king, gelatin desserts, ravioli, and spaghetti with meatballs.

For figuring the cuts, packers may use as a base the number of cans they used in the second three months of either 1949 or 1950.

Packinghouse Cleanup

Use of detergents, enzymes and microorganisms in food spoilage and packinghouse wastes was given an airing at the recent meeting of the Council on Research of AMI.

L. W. Mallman, Michigan State College, found that factors such as temperature, pressure, and concentration were all-important in cleaning, and that each situation required a distinct detergent and method of application. Improper rinsing procedures were also found to negate the best detergent application.

The viability of several species of microorganisms was found by A. J. Lund and H. O. Halvorson, Hormel Institute, to vary with the species, rate of freezing, rate of thawing, temperature of storage and nature of suspending medium. Freezing had no deleterious effect on protease enzymes, but diffusion was a rate limiting factor at freezing temperatures.

Pilot plant studies, reported by W. J. Fuller. Geo. A. Hormel & Co., indicated that packinghouse wastes can be economically handled by anaerobic digestion. He found that over 90 percent reduction of 5-day B. O. D. was

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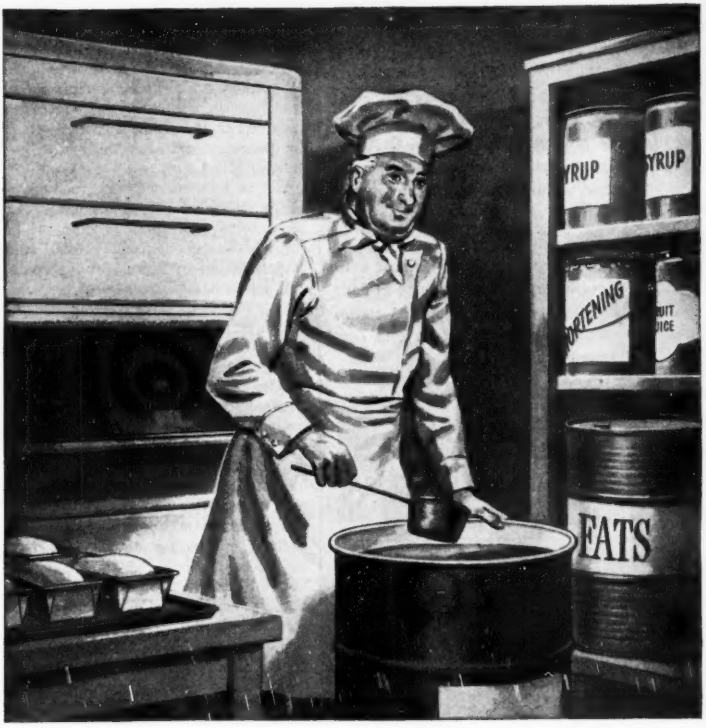

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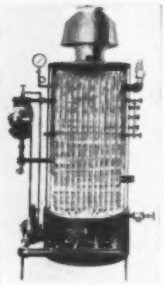
ENGINEERED STEAM

AT ITS AUTOMATIC, ECONOMICAL BEST

. . . the KANE BOILER PACKAGE



THE KANE Boiler is built to A.S.M.E. specifications, in sizes to 30 H.P.

Each KANE BOILER PACKAGE is carefully considered by us as an "individual" job,—from the customer's requirements to the finished unit. And each BOILER PACKAGE is a compact, self-contained steam source that includes: the correctly sized KANE Automatic Gas-Fired Boiler complete with gas burner and controls to maintain required steam pressure; and an M-K-O Automatic Boiler Feed system designed to return condensate and supply make-up water as required for highest operating efficiency.

The M-K-O Automatic Boiler Feed returns condensate and supplies small quantities of hot water as needed to the KANE Boiler.

Engineered Steam at its best with four decades of experience at your disposal—so, send your steam problem to us for study and recommendation.

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ELECTRIC VIBRATORS

Their 3600 vibrations per minute break down arching and plugging whether it's a small 1-cu.-ft. packaging machine hopper or a big storage bin.

Send us a description of your particularly troublesome hopper — giving gauge or thickness of walls, cubic content, material being handled, etc. We'll be glad to submit a recommendation.

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obtained in one day, when the raw waste was mixed with active anaerobic sludge before being fed to the digester.

Sanitation by Correspondence

A correspondence course in "Food Plant Sanitation" for food technologists, plant inspectors, processing and warehouse supervisors, offered by International Correspondence Schools, Scranton, Pa., provides one possible solution to a difficulty faced by many food producers in recent years: How to train employees to maintain a plant sanitation system after the system has been installed.

Not to be confused with food processing, this new course is made up of 24 lessons covering cleanliness of equipment and utensils, control and extermination of insects and rodents, and detection and removal of contaminating materials. Specific subjects include: Arithmetic; elementary chemistry; basic organic chemistry; sanitary chemistry; sanitary bacteriology; purification of water; operation of sewage treatment plants; sanitation in quality control; building construction and equipment; water supply, disposal and utilization; establishing and maintaining sanitary practices; legal aspects of pest control; detergents; sanitary packaging practice; and sanitary aspects of packaging material. Part of the course is based on the textbook "Food Plant Sanitation," by Milton E. Parker, and the balance is supplied from standard I. C. S. texts.

About 20 study hours per lesson (a total of 480 hr.) are estimated as required to complete the course.

Can Frozen Salmon

"Though slightly inferior to the best packs put up from unfrozen fish," a marketable canned salmon may be produced from frozen whole salmon, although such canning is not as satisfactory as with tuna, Maurice Stansby, of U.S. Fish & Wildlife, told the 14th annual canned salmon cutting demonstration and fisheries research conference sponsored by the Northwest branch of the National Canners' Assn., at Seattle.

Frozen salmon is more difficult to can than frozen tuna, said Stansby, since the pre-cooking of tuna "gives a chance for escape of certain undesirable products that may have formed while the fish were frozen," whereas salmon is cooked and heat-processed in a sealed can. Furthermore, the skin and the dark meat lying just beneath, which contain much of the oxidized oil, are removed in the case of tuna, but not salmon.

When salmon are kept in cold stor-

are your profits losing weight

...on a diet of damaged freight?

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VIKING ROTARY PUMPS are RUGGED!

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For Canning Contributions

National Canners Assn. recently cited the American Can. Co. for its outstanding contributions, during the past 50 yr., to the canning industry and to a higher standard of living for the American people. Carlos Campbell, executive secretary, NCA, is shown here presenting the citation to Pres. C. H. Black of American Can Co.

age more than two or three months, oxidation of oil results, making the bland fish oil rancid.

In the canning of frozen salmon, Stansby recommends that the fish be frozen rapidly and that they be stored not longer than two months at a temperature of zero. After two months, salmon canned after freezing has a firmer, drier texture, even becomes "tough and woody." Moreover, the small part of the protein that rises to the surface and coagulates to form a white curd, resembling egg white in the can, becomes dark and discolored if the fish has been kept frozen more than two months.

The curd problem might be eliminated by dipping the fish in an acid or brine solution before canning, Stansby suggested. An ice glaze is a protection against this oxidation, to which pink salmon are more prone than other species.

Classify Concentrated Milk

Increase in the quantity of milk sold in concentrated form, as a competitor of bottled fluid milk, has necessitated action by the Department of Agriculture as to its classification. In several areas of Massachusetts, including Boston, it has been decided that this particular use, not previously mentioned in federal orders, should be recognized. The new concentrated milk is now to be in Class I because it is essentially a competitor of bottled fluid milk largely for home use.

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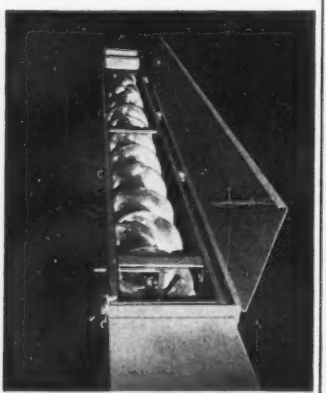

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OMEGA MACHINE COMPANY

revised, page 2823, March 31 *Federal Register*, effective April 30.

Frozen Brussels Sprouts, revised, page 3103, April 10 *Federal Register*, effective May 10.

Canned Grape Juice, revised, April 13 *Federal Register*, effective May 13.

Cream for Use in Manufacture of Butter, new, proposed, date for written comments extended to June 30, by notice in April 13 *Federal Register*.

Rye, revised, page 2649, March 24 *Federal Register*, effective July 1.

Soybeans, will not be amended "at the present time", according to USDA Press Release 857-51, dated April 5. This decision followed "careful review of all communications, representations submitted at the hearings" which were held in January and February, "and other information available to the Department".

F&DA Food Standards

Status of food standards of Food & Drug Administration in early April is reviewed below:

Court Actions

1. Supreme Court declared on March 26 "imitation *jam*" not "misbranded". (See separate story this section.)

2. Third Circuit Court of Appeals on March 21 remanded *salad dressing* proceeding to Federal Security Administrator for rehearing on use of "cream, milk, and milk products . . . for reconsideration whether the optional ingredients proposed . . . should be allowed as alternative constituents in fixing standards of identity for salad dressing." Petitioner was Cream Wipt Food Products Co. of Philadelphia. No date has yet been set for further hearing on this matter.

Policy Statement

Skim milk *cheese* will be permitted as an optional ingredient for manufacturing pasteurized process cheese food and pasteurized process cheese spread until a hearing has been held on proposals "from a substantial portion of the interested industry" to amend the regulations which become effective February 24. In the meantime, however, such foods must comply with other requirements of the existing regulations as well as the general provisions of the law.

Future Hearings

1. *Salad dressings* (see court actions above).

2. *Cheese foods* (see policy statement above).

3. *Canned pineapple and canned pineapple juice*, standards of identity, quality, and fill of container. Postponed hearing scheduled for October

(*Turn to page* 198)

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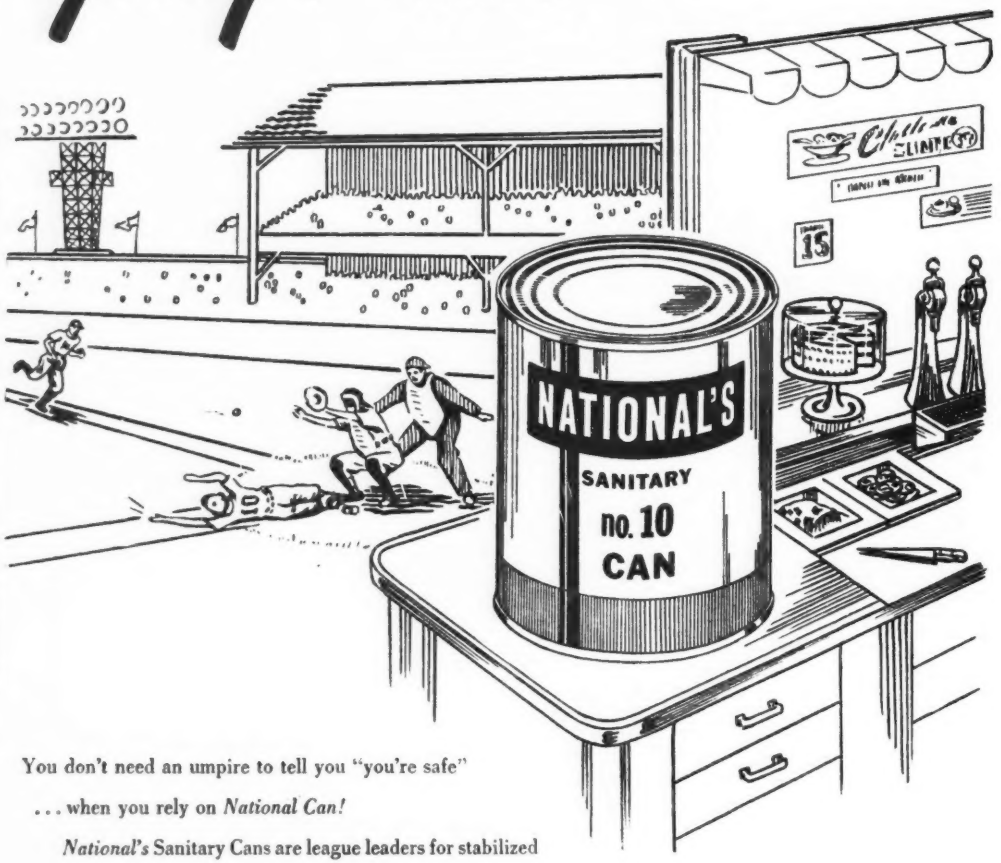

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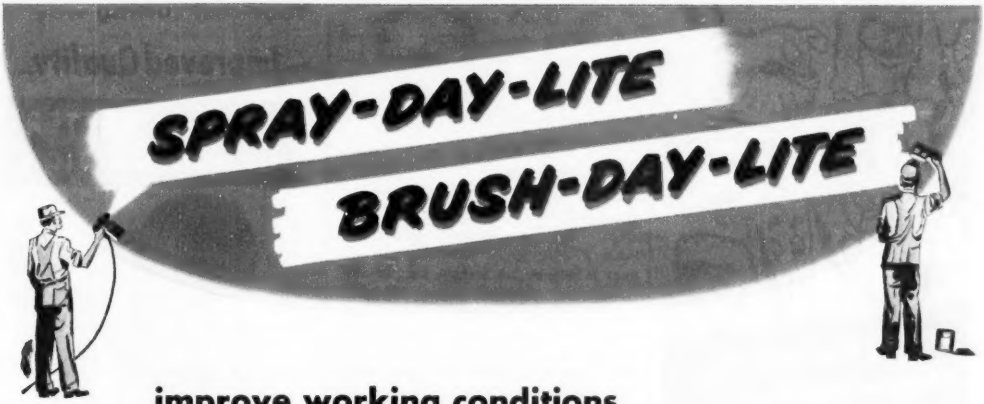

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and speed production

with just one-coat

of America's foremost Maintenance Paint!

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A service comprising detailed color suggestions tailor-made for you by trained consultants from Glidden Color Laboratories with over 21 years of experience. These comprehensive color harmony plans for interior painting based on Glidden's famous Sight Perfection Program pay important extra dividends! For complete information about this free service, write Dept. B-5.

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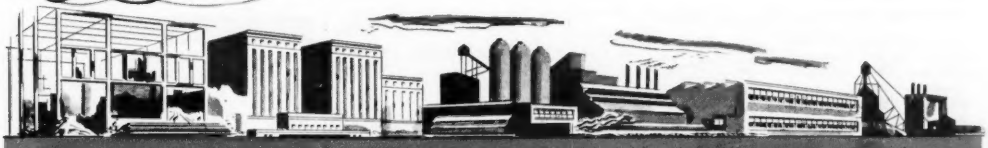

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OFFICES IN PRINCIPAL INDUSTRIAL CITIES
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15, 1951. Details not yet available.

4. *Canned tuna,* hearing rumored but no date set yet; initiative of Administrator.

5. *Frozen vegetables,* hearing rumored but no date set yet; initiative of Administrator.

Hearing In Progress

Ice Cream, new, standard of identity. On April 9 the hearing resumed after a two-week recess. Emulsifiers and stabilizers were to be discussed for the next month or six weeks; no pharmacologic data expected during this interval. Flavoring, sweetening ingredients, minimum fat content, and total milk solids, next on the agenda, were to be discussed late May and early June. The hearing is approximately one month behind the revised tentative schedule dated January 24, as issued by Presiding Officer Turkel.

Tentative Orders Awaited

1. *Residue tolerances,* on fresh fruits and vegetables; new. Expected in summer; hearing adjourned in September 1950; briefs were filed until December.

2. *Fruit preserves, jellies, and butters,* amendments, standards of identity. Expected soon; hearing adjourned in Jan.; briefs were filed until March.

3. *Evaporated milk,* amendments, standard of identity. Expected soon; hearing held in March; briefs due in March.

4. *Margarine,* amendments, standard of identity. Expected soon; hearing required 8 days; briefs may be filed until May 21. Considerable discussion but no major opposition to any of four principal proposals. Fifth proposal (to permit use of a soy "milk") encountered significant opposition from margarine manufacturers, and extensive cross-examination by F & DA.

Final Orders Awaited

1. *Canned corn,* amendment, standards of identity, quality, and fill. Expected soon; tentative order published in April 1950, exceptions filed in May.

2. *Bread,* new, standard of identity. Expected soon; effort being made to issue final order as soon as possible; tentative order published August 1950, exceptions filed in November.

3. *Frozen fruits,* new, standards of identity and fill. Expected soon; tentative order published in October 1950, exceptions filed in January.

4. *Canned mushrooms,* amendment, standards of identity and fill. Expected soon; tentative order published in February; exceptions filed until April 16, by extension from date originally set.

Standards Completed

None since last reported. (FOOD ENGINEERING, April 1951, page 226).

Your cost cutting way to *Improved Quality...*

through BETTER HOMOGENIZATION

Multi-Flo HOMOGENIZER

with the SINGLE-SERVICE VALVE

Low-Cost Valve, easily replaced with every run, assures uniform homogenization

Leading Food Plant Operators who are benefiting from improved appearance and taste which result from proper homogenization are also discovering the cost-cutting advantages of CP Multi-Flo Homogenizers.

SINGLE SERVICE VALVE—

of exclusive CP design—is easily and *inexpensively* replaced. A new valve provides thorough "new machine" homogenization with *every* run. Regrinding of scored, worn valves is eliminated.

LOW PRESSURE OPERATION—

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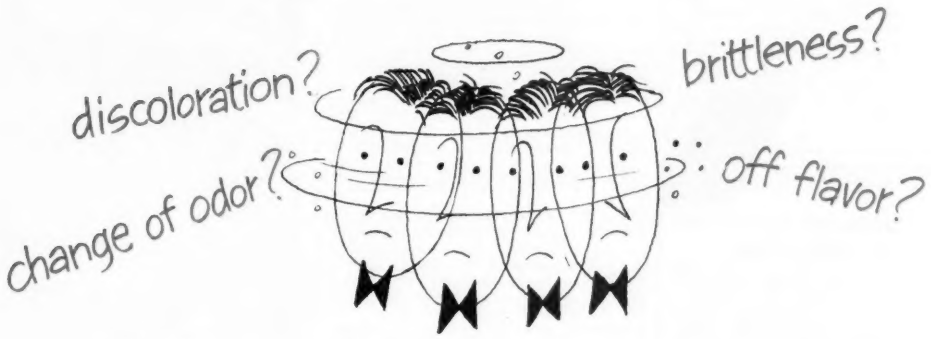

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The addition of small quantities of Tenox materially retards the reaction which takes place between any susceptible or unstable ingredients and oxygen. Because Tenox is stable at high temperatures, it can be added at the most convenient point in your processing procedure. Since the oxidation reaction is accelerated by a rise in temperature, this point is usually prior to the application of heat.

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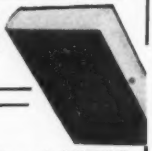

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2. **Supplies a thorough reference on the fundamentals of insecticides,** their chemical and physical properties, and their effects upon insects, plants, and higher life, including man. Covers a wide variety of insecticides—the arsenicals, sulphur and its compounds, the alkaloids, etc.—arranging them in terms of their chemical properties. Considers characteristics of dusts and sprays, the formulation of mixtures and compounds, etc. **By Harold H. Shepard, Insecticide Div., Livestock Div., U. S. Dept. of Agriculture. 504 pages, 22 illus., $7.00**

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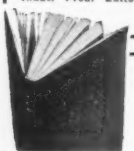
3. **A collection of case histories, each showing how a manufacturing company solved a specific problem in materials handling.** These case histories bring you problems as they actually occured in industry—explain step-by-step how they were dealt with. Each case gives **facts**—materials, methods, illustrations, and data of a practical, how-to-do-it nature. Covers the full range of materials handling problems—situations in assembly, receiving, shipping, etc. **By Lewis K. Urquhart, Managing Editor, and Carroll W. Boyce, Indus. Prod. Editor, Factory Management and Maintenance Magazine. 440 pages, 738 illus., $8.00**



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4. **Shows proprietors and operators of small stores, factories, and service companies how to** buy, sell, manufacture, operate, and control all parts of their businesses more efficiently. Includes many valuable "do's and don'ts"—ideas, methods, and pointers to help you make more profit. Tells how to keep good records, check credit, plan buying, train employees, lay out a plant, etc. Helps you plug every loophole for escaping profits. **By J. K. Lasser, Adjunct Prof. of Taxation, Chairman, Inst. on Federal Taxation, N. Y. U. 350 pages, $3.95**

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Schedule of Events

May

1– 3—American Oil Chemists Society, Spring meeting; Roosevelt Hotel, New Orleans, La.
7–10—U. S. Brewers Foundation; Chase and Park Plaza Hotel, St. Louis, Mo.
14–16—Millers National Federation, annual meeting. Edgewater Beach Hotel, Chicago, Ill.
14–18—Assn. of Operative Millers, annual meeting; Sherman Hotel, Chicago, Ill.
21–25—American Assn. of Cereal Chemists, annual meeting; Nicollet Hotel, Minneapolis.
21–25—Association of Food and Drug Officials of the U. S., annual meeting, Hotel Adelphia, Philadelphia.

June

3– 7—National Confectioners' Assn., 68th convention and 25th candy industries exposition; Stevens Hotel, Chicago.
17–21—Institute of Food Technologists, 11th annual meeting, Statler Hotel, New York City.
21–23—Grocery Manufacturers of America, mid-year meeting; Greenbrier, White Sulphur Springs, W. Va. —*End*

How to Set Safety Record

—*Continued from page* 179

Green Light Plus Cooperation

Our achievement in safety is pretty much according to pattern. When a plant hires a safety engineer, and gives him the necessary cooperation right down the line, within three years time he can come up with a material improvement in the safety picture.

Cooperation—without which the safety engineer is lost—must come from management, supervisory personnel, the medical department, the engineering staff and employees in general.

Management assistance is basic. The safety man must be given free rein. He must be trusted to do a job without interruption. And the bridle on the budget has to be loosened to provide the equipment, guards and devices necessary to properly institute and carry out a sound program.

Supervisory personnel probably carry more of the weight than anybody else. Included, principally, are department heads, supervisors and foremen. It is impossible for a safety director to conduct a training plan with each individual employee in a major plant. He must see to the correct and effective instruction of these supervisors, and then sell them on the idea of doing a whole-hearted job of training and overseeing their underlings. If that isn't done, the whole plan will bog down and all else is in vain.

In addition to the actual training of the plant man, the supervisor is essential in the scheme of determining exist-

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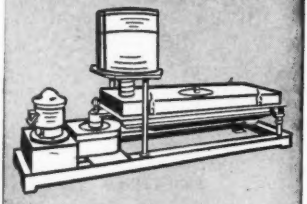

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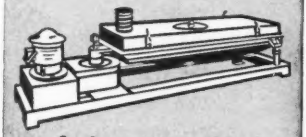
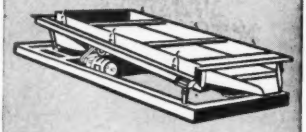


of almost any kind —and materials in liquid suspensions



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- — because atmospheric boiler-room air is constant in temperature and therefore in density, the weight of air delivered for combustion by a forced draft fan is also constant and always gives proper air-fuel ratio (CO_2) resulting in maximum efficiency and freedom from combustion problems.
- — the electrical load, or power requirement, of a forced draft fan is at a minimum, because the fan handles a lesser volume of air.
- — low fan maintenance and longer fan life with forced draft fans since they operate with cool, clean boiler room air — no problems with high bearing temperatures and corrosion.
- — air is under pressure in the combustion chamber of a forced draft boiler, with no possibility of "diluting" air entering the chamber. Maximum boiler efficiencies are always attained when head plates and casings are tight.
- — lower initial fan cost, better space arrangement, and better appearance are gained because forced draft fans are considerably smaller.
- — casings for forced draft fans are cool — require no insulation — contribute to safer operation and cooler boiler rooms.

Forced draft is one of many reasons why you get a greater return from your investment in a Cleaver-Brooks boiler — a boiler of foremost quality in every detail and with many immediate and long-range cost-saving features. Cleaver-Brooks self-contained boilers are available for oil, gas, combination oil and gas firing — 15 to 500 hp., 15 to 250 lb. p.s.i.

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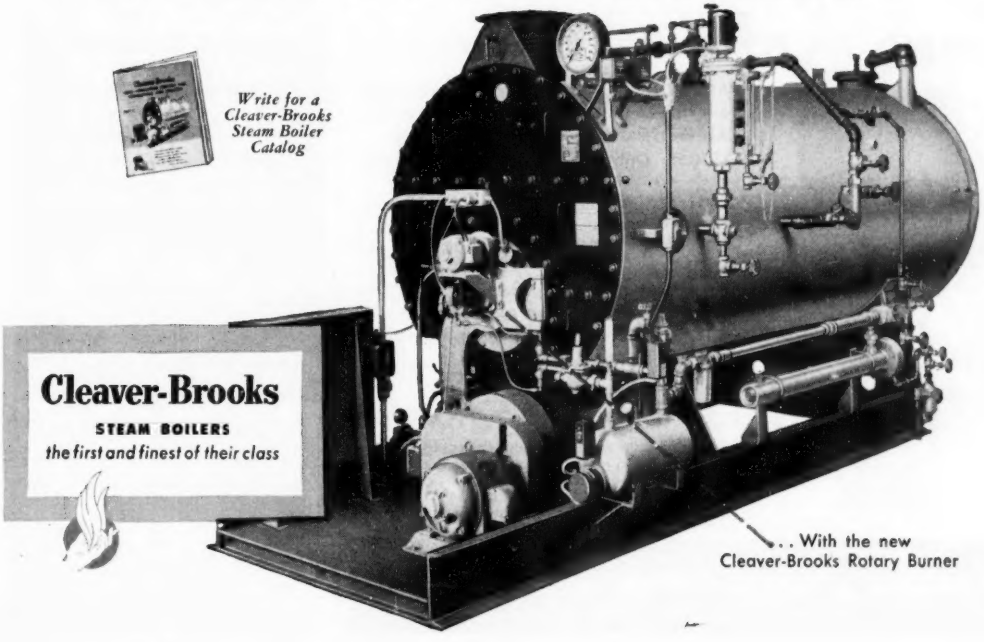

ing hazards, and finding sound and workable ideas which will eliminate them.

A safety man isn't entirely a mechanical engineer. He must also be a preacher-teacher and salesman. Neither can he know as much about the individual machines in a large plant as the men who run them.

Determining a hazard, actual or potential, is only part of the job. Proposing adequate corrective measures is the other fraction.

So the safety director has to gain the confidence and assistance of the foremen and workmen, because together they usually can provide the needed answers. And when they do, you can be sure the solution is going to be practical.

Medicos Prevent Accidents

Much credit is due the medical department for our safety record. The medical staff is made up of a director and a second doctor; a supervising nurse and three duty nurses; and an optometrist whose main interest is the care and fitting of safety goggles.

To a great extent, we depend upon the medical department to ferret out those locations, or machines, or pieces of equipment, which are sources of minor injuries. The safety director then follows through to the faulty condition. But more than that, the first job of the medical department is the immediate treatment of distressed employees. The purpose is to keep them in prime physical condition so they will be alert and not prone to the negligence which leads to accidents.

Primary, of course, is the immediate and proper care of minor injuries. Little nicks, cuts and bruises really don't amount to much at inception, but they can lead to more serious infections that cause loss of working time. The medical unit here averages more than 2,000 treatments a month, in addition to regular pre-employment and retirement physical examinations.

All absences from work are reported to the supervising nurse for investigations to determine whether the employee needs, and is getting, professional attention. As one phase, the Blatz medics make as many as 60 home and hospital calls monthly.

Proper medical equipment is vital, too. When the company erected a new $6,000,000 bottling plant three years ago, it provided a large area for its medical people. Included are a waiting room, principal treatment room, three private rooms, a doctor's examination office and a private office for the chief nurse. New equipment was installed throughout. And one of our most valuable and useful units is a Pulmotor.

Engineers Play Big Part

Into the safety scheme, as a powerful assistant, comes the engineering department. It has to be ready to take immediate corrective steps in revamping machinery that is a potential safety hazard. It also must be able to design, and in many cases build, necessary guards and other protective devices where experience says they are indicated.

If any plant's safety program is to be effective, the engineering department also must be responsible for the essential maintenance and cleanliness of buildings and passageways, effective lighting, selection of eye-easing patterns for interior painting, and hundreds of other such features.

But when you add it all up, safety comes down to one thing: The average employee. If he is given a good safety program and is properly trained, and if he works safely, keeps himself in good physcial condition, keeps his mind on what he is doing, and is thoroughly imbued with the belief that all of this safety business is but for his own good —then the plan is good, because it works.

End (*Resume reading on p.* 97)

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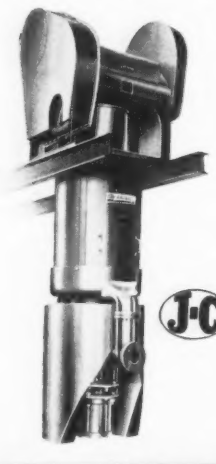

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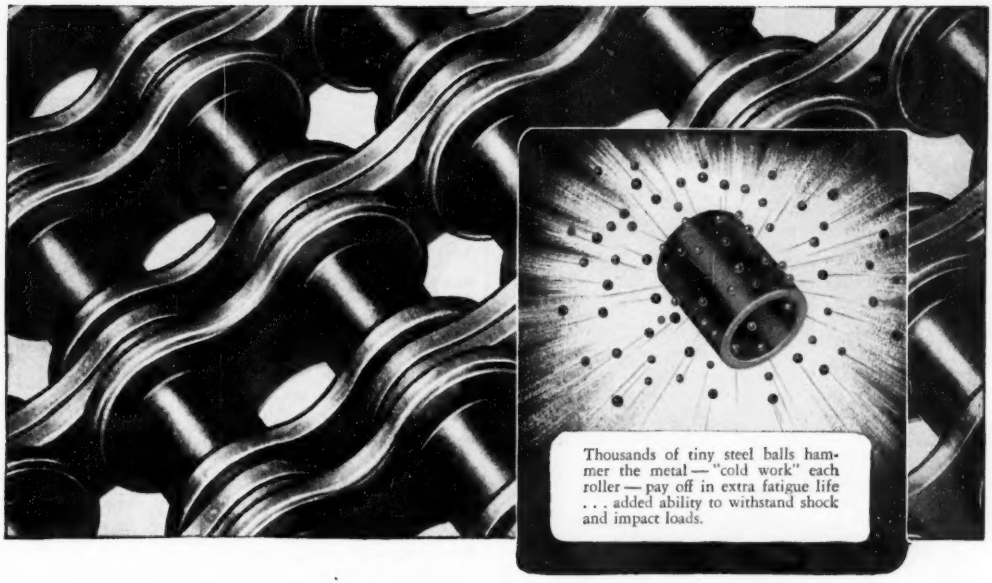
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. . . one of the extra-strength features you get with every LINK-BELT Roller Chain

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Link-Belt Roller Chain is available in single or multiple widths, in 3/8 to 3 in. single and double pitch. For the best in roller chain, get in touch with your nearest Link-Belt office.

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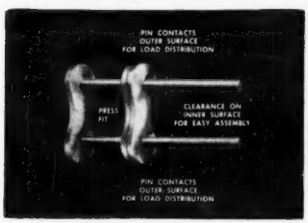
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PRESS FIT
CLEARANCE ON INNER SURFACE FOR EASY ASSEMBLY
PIN CONTACTS OUTER SURFACE FOR LOAD DISTRIBUTION

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A coffee company in the Southwest was "giving away" an average of 1/8 oz. with every 1 lb. package due to overweights. Now, with Triangle Elec-Tri-Pak Weighers, they weigh and fill packages to an average accuracy of *plus or minus 1/32 oz.* Maximum variation is only 1/16 oz. — underweights are rare. The saving in coffee alone averages *$35.00 per day!* . . . enough to pay for the machine in only 100 days operation.

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Men & Companies

Industry

American Bakers Assn., through Pres. Karl E. Baur, has appointed Harold F. Fiedler to succeed the late Tom Smith as secretary. Mr. Fiedler is a former secretary of the Pennsylvania Bakers Assn.

Bachman Bakeries, Reading, Pa., has merged with Purity Pretzel Co., Harrisburg, Pa. This is Bachman's second acquisition within recent months, the company having purchased Layfield Pretzel Co., Allentown, Pa., late in 1950.

The Best Foods, Inc., New York City, elected Fred D. Goodyear vice-president in charge of the western division, succeeding Irving C. Bjork, resigned.

Blitz Weinhard, Portland, Ore., has increased its brewery output from 37,000 to 50,000 gal. per day through the installation of a new primary masher.

Borden's has named Joseph F. Malone vice-president of its Chicago Milk Division. He will be in charge of accounting and purchasing. Other division appointments include T. Campbell Whyte, assistant treasurer, Fred J. Barter, director of procurement and production, and John H. Lapperre, division controller.

Candy Industries, Inc., formerly of New York and Chicago, has leased a building in San Gabriel, Calif., which it plans to transform into a modern, fully equipped plant for the production of hard and filled candies. Pres. C. A. Frederick said distribution would be nationwide.

Carl J. Eastman has been appointed assistant to the president, Leslie Salt Co. He was formerly a vice-president of N. W. Ayer & Son, advertising agency.

Frank A. Vorhes, Jr., has been named chief of the food division, Food & Drug Administration, succeeding the late Dr. W. B. White, who died Feb. 24. Mr. Vorhes has been with F&DA since 1928, serving most recently as chief of the division of field operations.

Cedergreen Frozen Pack Corp., Bellingham, Wash., has acquired a Polar Frosted Foods plant at Seattle, including trade names and supplies.

Cobble Dairy Products, Inc., Lexington, N. C., has purchased the Selected Dairies plant at Anderson, S. C., and plans to double its capacity.

Coca-Cola recently opened Asia's largest and most modern bottling plant in Bombay.

Fruit Industries, Ltd., San Francisco, a wine-grower cooperative, has changed its name to California Wine Assn., to end confusion about the organization.

Hawaiian Pineapple Co., plans a $1,000,000 concentrate-freezer plant in Honolulu. It is planned to put frozen concentrated pineapple juice on the market late this year, using a newly-developed processing technic to turn out the product. The new plant will also permit Dole to expand production of fresh frozen pineapple chunks.

Home Candy Co., Huntsville, Ala., was destroyed recently by fire, with the loss estimated at $350,000.

Hunt Foods has appointed John D. Vellis to head its new trade relations department as vice-president. The new office will provide a liaison between the company and its distributors, suppliers, and food processors.

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VISQUEEN has been alerted. And like a good soldier, VISQUEEN must be ready to leave civilian life and return to Active Duty.

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That may make it tough on you who have come to depend on this *distinctive* polyethylene film. Currently, not all of our production is required by the Government. And until such time as the *entire* VISQUEEN output must be devoted to Defense, we pledge ourselves to keep trying to fill your orders to the very best of our ability.

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IMPORTANT! VISQUEEN film is all polyethylene, but all polyethylene film is not VISQUEEN. VISQUEEN is the only film produced by the process covered by U.S. Patent No. 2461975. Only VISQUEEN film has the benefit of the research and extensive technical experience of The Visking Corporation, pioneers in the development of polyethylene film. Be sure. Always specify VISQUEEN film for superior tear and tensile strength and greater uniformity.

*T. M. The Visking Corporation

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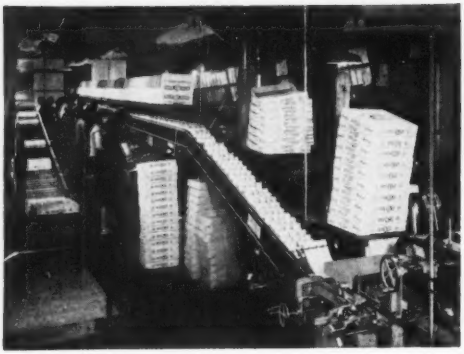

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Original cost is low. Superior quality assures minimum upkeep. On-the-job savings result from simplified loading, unloading, processing, storing; increased working and storage space; elimination of re-handling; greater man-hour output.

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Anthony G. Castellani has taken over research on bacteriological problems and routine examinations under the service program for the American Baking Institute, Chicago. His first project will be to investigate practical methods of controlling staphylococcus food poisoning.

Indiana Food Technologists were chartered recently as a chapter of the Institute of Food Technologists. IFT President Sharpe presented the charter at a meeting in Indianapolis. Also in attendance were Col. C. S. Lawrence, executive secretary of IFT, and W. B. Butterfield, president, Indiana Canners Assn. The chapter is the 20th in IFT's national organization.

Milford Poultry Co., Milford, Del., has filed a charter of incorporation, listing maximum authorized stock of $50,000.

Pet Milk Co. plans construction of a plant at Athens, Tenn. Expected to be completed within six to eight months, the new plant will handle milk and, later, will be expanded into a complete manufacturing unit.

Pillsbury Mills, Inc., recently announced purchase of Ballard & Ballard, Louisville, Ky., one of the leading flour millers of the southwest. The transaction is said to have involved between $12,000,000 and $15,000,000. All B&B brand names will be retained, with the company operating as a separate unit within Pillsbury's national framework.

A. E. Staley Mfg. Co. is drawing plans for the erection of a 5,000,000 bu. capacity grain elevator at the company plant in Decatur, Ill. Construction was to start last month, but progress was expected to depend upon availability of materials.

Welch Grape Juice Co. was scheduled to initiate marketing of its new sweet wine last month. The company has been working more than a year developing a popular priced sweet wine made from Concord grapes.

Seymour Packing Co., Topeka, Kan., has named Carroll W. Waechter southeastern division manager, with headquarters at Jacksonville, Fla.

Personnel

Joseph R. Braden, vice-president, Richmond-Chase Co., San Jose, has been appointed to the California Water Pollution Control Board, to complete the unexpired term of the late Ralph E. Sanborn.

James H. Carmichael has been named vice-president and general manager of the Mobile branch of the Coca-Cola Bottling Co. He is a graduate of the University of Georgia and a member of the executive board of the American Bottlers of Carbonated Beverages.

Robert deS. Couch has been appointed an assistant in the government controls division of General Foods Corp. Formerly, he was director of packaging research in the company's Hoboken laboratories.

H. P. Faye has been elected president of the Hawaiian Sugar Planters Assn. for 1951, succeeding Philip E. Spalding. Mr. Faye is president of American Factors, Ltd.

Victor H. Gies, vice-president, Mars, Inc., Chicago, will be general chairman of the National Confectioners Assn.'s 68th annual convention, scheduled for Chicago, June 3 through 7. Frank K. Gleason, E. J. Brach & Sons, is program chairman.

Edward J. Grier, manager of the Topeka plant of John Morrell & Co. and also company secretary and general counsel, has been elected to the board of directors.

Robert A. Larsen, for the past four years director of research on the application of chemicals to foods at DuPont's Food Laboratory, has joined the Quartermaster Food & Container Institute as chief of the cereal and baked products division.

Frederick G. Morton, former supply officer for Fish & Wildlife's fur seal division, has been appointed representative for the defense fisheries administration in Oregon, Washington and Alaska. His offices will be in Seattle.

John A. Owen, vice-president, Pratt-Low Preserving Co., Santa Clara, has been elected president of the Canners League of California. George E. McDearmid, Libby, Mc-

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- GREATER CAPACITIES
- WIDER RANGE OF APPLICATION for LOW OR HIGH VISCOSITY LIQUIDS OF ALL TYPES

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New York Chicago Philadelphia San Francisco Los Angeles Houston Tulsa Ft. Worth

Neill & Libby, San Francisco, and R. G. Lucks, California Packing Corp., were elected industry vice-presidents.

Donald M. Swartout has been appointed director of research for the California Walnut Growers Assn. His department will study walnut processing, preservation and packaging.

W. A. Wentworth, director of industry relations, Borden Co., New York City, has been elected chairman of the executive committee, National Dairy Council. He succeeds E. W. Tiedman, who is now head of the OPS dairy branch.

Associated Industry

Borg-Warner has named Carl R. Brick as an assistant to Roy C. Ingersoll, president. He was formerly the corporation's industrial training consultant.

Ball Bros. Co., Muncie, Ind., has purchased Container & Closure Sales, Inc., Chicago, and has appointed S. R. Bowman to manage the offices.

Bemis Bros. Bag Co., St. Louis, recently completed its multiwall plant and storage facilities at Peoria, Ill. The new building, costing more than $500,000, is in addition to the company's manufacturing plant at Peoria.

Dairy Industries Supply Assn. re-elected Pres. K. L. Wallace, Walker-Wallace, Ltd., Toronto, at a recent board meeting. Carl Wood, Cherry-Burrell Corp., and Roy E. Cairns, Waukesha Foundry Co., were elected vice-president and treasurer respectively.

International Nickel Co. of Canada has elected Pres. John F. Thompson to the additional office of chairman of the board. In the latter position he succeeds Robert C. Stanley.

Johns Manville Corp., recently elected Leslie M. Cassidy chairman of the board and chief executive officer. Adrain R. Fisher was appointed president of the corporation. Mr. Cassidy succeeds the late Lewis H. Brown, and Mr. Fisher succeeds Mr. Cassidy.

Lamson Corp., Syracuse, N. Y., recently opened a new two-story office in Cleveland, with John J. Egan Jr. as the new regional manager.

Link-Belt Co., Chicago, recently elected Robert C. Becherer vice-president. Mr. Becherer is general manager of the company's Ewart plant in Indianapolis.

Liquid Carbonic Corp., Chicago, has elected Bryon W. Goulding a vice-president. He will continue as manager of the Carbon Dioxide division, with headquarters in New York City.

Stephen L. Galvin, formerly technical service director, Huron Milling Co., was named director of research for the Pepsi-Cola Co. Mr. Galvin was, at one time, head of engineering and research for Continental Foods.

Monsanto Chemical Co. is constructing two plants, one in Seattle, the other in St. Louis, to produce vanillin from lignin. Construction was expected to start about May 1, with a total cost of around $1,000,000.

Olympic Seafoods, Inc., has been organized at Seattle, Wash. by Hiram M. McAllister and Edwin P. Odion. The new firm will pack crabs under the Haines Oyster Co. label.

Foster D. Snell, chemical engineering consultants, recently opened the new offices and laboratories of the newly developed Supplee division of the company. A major function of the lab will be the assaying of vitamin D for dairies fortifying their milk with vitamin D concentrate.

Deaths

D. C. Ball, 93, founder and chairman of the board, Oakite Products Co.—March 23, at Lake Placid, N. Y.

Richard D. Hebb, 72, first Swift & Co. public relations official—March 1, at Salinas, Calif.

Ralph E. Sanborn, long time executive of California Packing Corp., and recent chairman of National Canners Assn. scientific research committee—March 19.

George H. Swift, 73, sixth son of the founder of Swift & Co., and former supervisor of the company's New England interests—March 9, in Boston. —*End*

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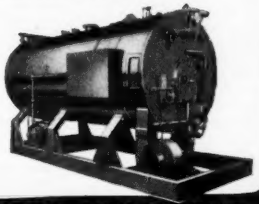

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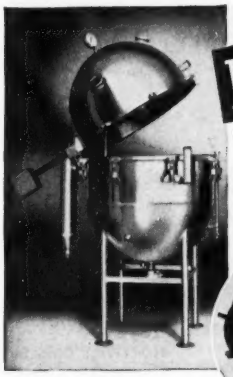

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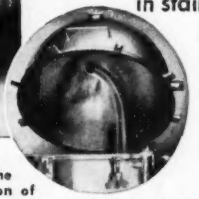

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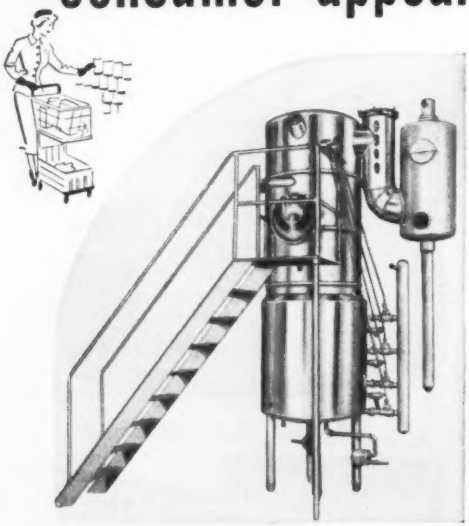

Vacuum cooking protects the flavor, color and physical composition of fruit spreads because it permits finishing temperatures of around 134° F., and movement of ingredients and finished product by air pressure or vacuum.

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Apricots Split in Machine Equipped With Rotating Holder and Flexible Knife—*J. C. Stroeve, Sumner, Wash. No. 2,525,245. Oct. 10, 1950.*

Meat-Packing Edible Fat Scraps and Trimmings wet-Rendered to Recover Lard Content and Stick-water Concentrated, Dried and Pressed for Removal of Grease Content and to Form Cake of Increased Protein Content—*H. K. Gillman, Fort Dodge, Iowa. No. 2,525,293. Oct. 10, 1950.*

Fish Presswater Concentrated to Relatively low Vicosity Containing at Least 50 Percent Solids and Proteolytic Enzyme—*J. K. Gunther, Decatur, Ind., and L. Sair, Evergreen Park, Ill., to Central Soya Co., Inc., Fort Wayne, Ind. No. 2,525,294. Oct. 10, 1950.*

Doughnuts Glazed During Continuous Movement Into, Through, and Out of Glazing Vat—*J. C. Lunsford to H. C. Rhodes, Portland, Ore. No. 2,525,306. Oct. 10, 1950.*

Gluten Removed From Starch-Gluten Slurry by Froth Flotation —*C. E. Smith to A. E. Staley Mfg. Co., Decatur, Ill. No. 2,-525,430. Oct. 10, 1950.*

Food Material Treated With Liquid Additive by Vacuum Impregnation—*H. J. Bierman, Chatham, N. J., to Ingersoll-Rand Co., New York City. No. 2,525,-561. Oct. 10, 1950.*

Flour Dehydrated by Heating Above 100 deg. C. for Relatively Short Period Followed by Rapid Cooling Preliminary to Addition of Other Ingredients for Prepared Flour Mix—*E. G. Gustavson, Clarendon Hills, Ill., to Quaker Oats Co., Chicago, Ill. No. 2,-525,599. Oct. 10, 1950.*

Meat Recovered From Crabs by Tubular Mechanism Open at Ends and With Cutting Edge on one end to cut Core From Body of Crab—*R. M. Johnson, Beaufort, S. C., to Blue Channel Corp., Port Royal, S. C. No. 2,-525,604. Oct. 10, 1950.*

Citrus Waste Processed to Recover Solids as Dried Peel and Pulp Liquid as Molasses—*E. M. Burdick, Weslaco, and J. S. Allen, McAllen, Tex., to Texsun Citrus Exchange, Weslaco, Tex. No. 2,-525,645. Oct. 10, 1950.*

Crude Glyceride Oils Refined by Treating With Non-Volatile, Water-Soluble, Organic Non-Soap Synthetic Detergent and Centrifuging to Remove Oil Insoluble Hydrated Gums—*M. Mattikow, New York City, to Benjamin Clayton, Refining, Unincorporated. No. 2,525,702. Oct. 10, 1950.*

Concentrated Sugar Syrup Consisting of Dextrose, Levulose, and Sucrose and Containing Valuable Water-Soluble Vitamins—*J. P. Bartz, Fort Lauderdale, Fla. No. 2,525,761. Oct. 17, 1950.*

Hidden Weevil Infestation in Grains Detected by Immersion in Dye Solution—*J. C. Frankenfeld, Manhattan, Kan., to People of USA. No. 2,525,789. Oct. 17, 1950.*

Doughnuts Made on Rotary Cutter Operating on Horizontal Shaft —*S. A. Williamson, Los Angeles. No. 2,525,987. Oct. 17, 1950*

Citrus Fruit Split Into Halves While Mechanically Fed to Juice Extractor—*H. L. Wurgaft, Fullerton, Calif., to F. S. and M. G. Markham. No. 2,525,990. Oct. 17, 1950.*

White Mono- and Di-Saccharide Sugars Recovered in Powdered and Crystalline State From Colored Syrups Without Forming Molasses Byproduct—*J. P. Bartz, Fort Lauderdale, Fla. No. 2,526,-111. Oct. 17, 1950.*

Coffee Ground in Rotating Burr Mill Equipped With Overload Release—*F. C. Rudolph and R. T. Watts, New York, to The Enterprise Mfg. Co., Philadelphia. No. 2,526,160. Oct. 17, 1950.*

Butter Made Continuously From Neutralized Sour Cream Concentrated to 80-85 Percent Fat by Centrifuging—*P. H. Staaff, Alsten, Sweden, to Aktiebolaget Separtor, Stockholm. No. 2,526,292. Oct. 17, 1950.*

Margarine Product Made to Consist of Fat Globules, Water Droplets, and Minute Air Bubbles Enveloped in Milk Protein—*V. L. Turgasen, Crete, Ill. No. 2,526,-302. Oct. 17, 1950.*

Animal Intestines Mechanically

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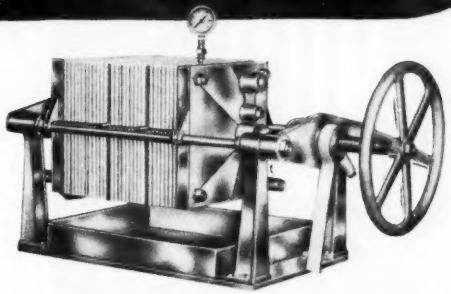

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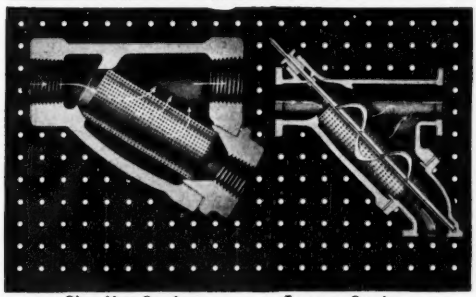

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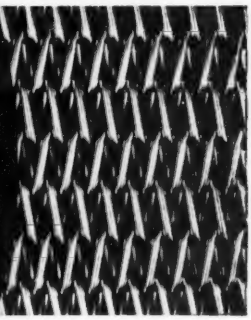

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Scraped in Preparation for Use as Sausage Casings—*R. Arlow, Wellington, and A. Young, Hastings, New Zealand, to Oppenheimer Casing Co., Chicago.* No. 2,526,449. Oct. 17, 1950.

Meat Ground in Machine Equipped With Insulated, Refrigerated Housing—*M. Pacciano, Jr., Brooklyn, N. Y.* No. 2,526,498. Oct. 17, 1950.

Egg Yolks Mixed With Magnesium Sulfate Solution to Precipitate Phosvitin—*D. K. Mecham, Richmond, Calif., to USA.* No. 2,526,680. Oct. 24, 1950.

Pears Peeled, Cored, and Split in Machine Equipped With Continuously Rotating Turrets—*A. R. Thompson, Los Gatos, Calif., to Food Machinery & Chemical Corp.* No. 2,526,712. Oct. 24, 1950.

Puffed Food Product Made of Cooked Waxy Cereal Starch and Toasted—*M. W. Alderman, Battle Creek, Mich., to General Foods Corp., New York.* No. 2,526,792. Oct. 24, 1950.

Fat Stabilized Against Rancidity With Hydroxychroman and Rice Bran Extract—*P. Gyorgy, Villanova, Pa., to Wyeth, Inc., Philadelphia.* No. 2,526,865. Oct. 24, 1950.

Dried Green Coffee Prepared Without Injury to Beans During Shelling and Without Fermentation—*W. R. Johnston, Bronxville, and G. W. Kirby, Yonkers, N. Y., to Standard Brands Inc., New York.* No. 2,526,872. Oct. 24, 1950.

Green Coffee Beans Recovered From Pulped Coffee Cherries by Treatment With Pectic Enzymes—*W. R. Johnston, Bronxville, and H. E. Foote, New York.* No. 2,526,873. Oct. 24, 1950.

Cherries, and Similar Small Fruit Stemmed and Decapped Mechanically By Unit Operating in Inclined Plane—*J. D. Gaddie, Weslaco, Tex.* No. 2,527,182. Oct. 24, 1950.

Fruits and Berries Stemmed by Mechanical Means Operating in Horizontal Plane—*J. D. Gaddie, Weslaco, Tex.* No. 2,527,303. Oct. 24, 1950.

Fatty Materials Prepared for Rendering by Treatment With Proteolytic Enzymes Derived From Plant, Fungal, and Bacterial Growths—*P. Halmbacher, Waukesha, Wis., to Paul-Lewis Laboratories, Inc., Milwaukee.* No. 2,527,305. Oct. 24, 1950.

Peel of Citrus Fruit Pierced by Pins in Periphery of Rotating Cylinders for Recovery of Oil—*M. Koffler, Tel Aviv, Palestine.* No. 2,527,364. Oct. 24, 1950.

Small Strips of Meat Formed Into Blocks of Large Cross-Section Preparatory to Freezing, Cutting Into Thin Slices and Separating Into Small Flakes—*H. M. Condon to Grand Dutchess Steaks, Inc., Akron, Ohio.* No. 2,527,493. Oct. 24, 1950.

Food Frozen During Passage From Bottom to Top of Elevator Operating in Refrigerated Chamber—*J. L. Gilson, Hartsdale, N. Y., to V. R. H. Greene, Summit, N. J.* No. 2,527,542. Oct. 31, 1950.

Sorghum Freed of Outer Hull Without Disintegrating Grain Preliminary to Wet Milling—*R. L. Slotter, Minneapolis, Minn., and R. A. Anderson, Peoria, Ill., to USA.* No. 2,527,585. Oct. 31, 1950.

Fruits and Vegetables Juiced by Macerating Action of Cutting Element in Bottom of Perforated Basket Rotating at High Speed—*J. E. Bennett, San Francisco.* No. 2,527,695. Oct. 21, 1950.

Food Products Given Butter Flavor by Addition of 1 to 60 ppm. Sodium Butyrate—*J. W. Armstrong to Food Technology, Inc., Chicago.* No. 2,527,785. Oct. 31, 1950.

Kernels of Popcorn Treated in Cylindrical Tumbling Barrel Formed of Wire Mesh Screen—*J. J. Kooman to Confections, Inc., Chicago.* No. 2,527,826. Oct. 31, 1950.

Cheese and Cracker Combination Packaged in a Compartmented Cylindrical Container—*L. Drangle, Gilman, Wis.* No. 2,527,919. Oct. 31, 1950.

Food Coated with Calcium Polysulfide Solution Preliminary to Preservation by Refrigeration—*L. La Vine, Los Angeles.* No. 2,528,008. Oct. 31, 1950.

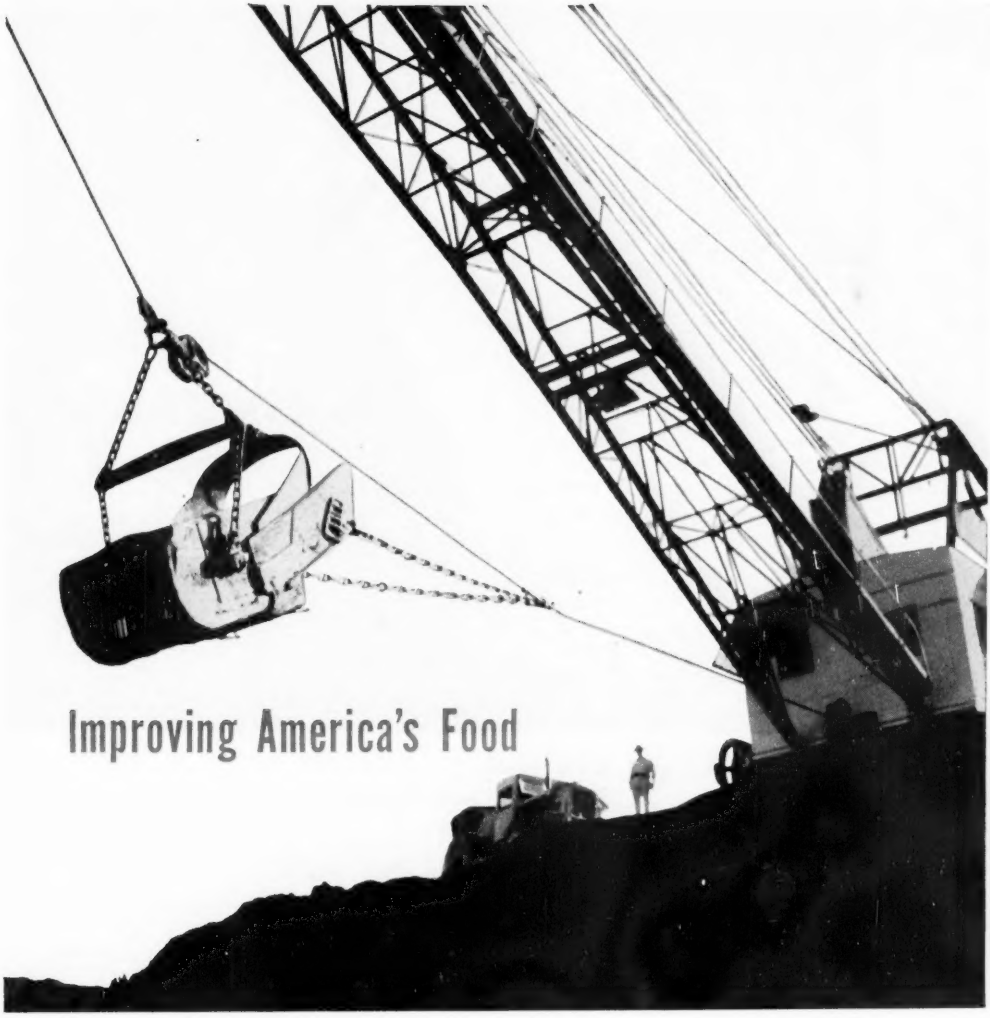
Glutamic Compounds Recovered by Ion Exchange From Sugar Solutions Containing Glutamic and Other Amino Compounds.—*E. B. Fitch, Westport, Conn., to The Dorr Co., Stamford, Conn.* No. 2,528,047. Oct. 31, 1950.

Sugar-Bearing Solutions Purified by Ion Exchange—*D. W. Jordan, Yonkers, N. Y., to The Dorr Co., Stamford, Conn.* No. 2,528,058. Oct. 31, 1950.

Ground Meat Wrapped in Paper and Formed Into Patties by Mechanical Means—*F. S. Elsaesser, Cincinnati.* No. 2,528,125. Oct. 31, 1950.

Fresh Meat Injected With Chilled Pickle Solution, Coated With Chilled Curing Paste, Subjected to Heat and Smoke at 145-170 deg. F. not to Exceed 12 hr.—*W. M. Zwosta, Columbus, Ohio.* No. 2,528,204. Oct. 31, 1950.

Cakes Baked in Tube Pan, Flavored by Absorption of Volatile Liquid From Perforated Container Fitted Into Opening Formed by Pan Tube—*J. N. Knbricht, Cherokee, Okla.* No. 2,528,233. Oct. 31, 1950.—*End*



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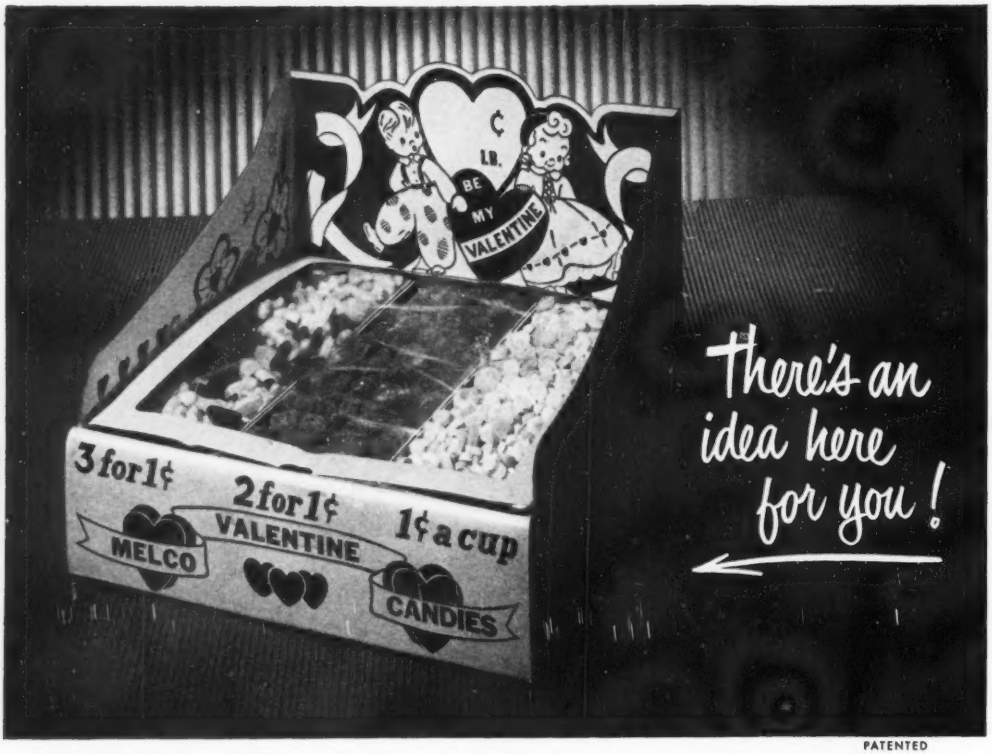

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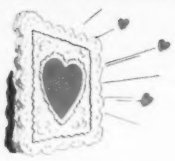

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Food Plant Equipment

Horizontal Centrifuges

Operating principles and applications of two high-speed horizontal Super-D-Canter centrifuges, PN-14 and PY-14, are presented in 12-page Bulletin 1254. Former has conical rotating bowl for firm solids, latter cylindrical bowl for soft solids.—*The Sharples Corp., 2300 Westmoreland St., Philadelphia 40.*

Vacuum Batch Pasteurizer

General description of vacuum batch pasteurizer for sweet cream, sour cream, milk, buttermilk, acidophilus, starter and mix, is contained in 12-page Bulletin 42C. —*Jensen Machinery Co., 110 N. Franklin St., Chicago.*

Steam Traps

In addition to specifications for line of steam traps, float traps, air release valves and pipe strainers, 36-page catalog gives practical information on how to maintain them.—*V. D. Anderson Co., W. 96 St., Cleveland 2.*

Chemical Reagent Feeders

Four-page Publication TP-29-C-1 particularizes following types of chemical reagent feeders: Automatic; water-operated; electrically-operated; and belt-driven. Also specifications and diagrams.—*Wallace & Tiernan, Newark 1, N. J.*

Packaged Steam Generators

Diagrams and photos in 8-page Bulletin SB-38-10M show advantages of new packaged water-tube steam generators, rated from 75 to 800 hp.—*Erie City Iron Works, Erie, Pa.*

Vacuum Filters

Porcelain and chemical stoneware vacuum filters are described in 6-page Bulletin F-27. Capacities range from 5 to 100 gal.—*The U. S. Stoneware Co., Akron, Ohio.*

Speed Recorders

Speedomax (all electrical) and Micromax (electro-mechanical) speed recorders are pictured and discussed in 20-page Catalog N-27. Tachometers to go with the recorders are also shown.—*Leeds & Northrup Co., 4907 Stenton Ave., Philadelphia 44.*

Diesel Engines

New line of 4-cycle DR diesel engines is described in 18-page Bulletin S-500-B52A. Engines are direct injection types, totally enclosed.—*Worthington Pump & Machinery Corp., Harrison, N. J.*

Automatic Packagers

Line of automatic packaging machines for flexible wraps, having volumetric, auger or liquid feeds, is specified in 8-page brochure. — *Transparent-Wrap Machine Corp., Route 17 & Henry St., Hasbrouck Heights, N. J.*

Crushers, Mills, Mixers

Eight-page bulletin pictures and describes crushers (jaw, rotary and balanced rolls); mills (hammer and ring roll); dry batch mixers; blenders; air separators and screens. —*Sturtevant Mill Co., Boston.*

Evaporative Condensers

Data and photos on 3 to 20-ton evaporative condensers are presented in 8-page bulletin. Also shown are 1½ to 20-ton packaged air conditioning models.—*Typhoon Air Conditioning Co., 794 Union St., Brooklyn 15, N. Y.*

Bulk Material Grinder

Extremely narrow range of particle size is claimed for new bulk material grinder delineated in 4-page folder. Rotating impellar is stated to be only moving part. —*Moore-Lowry Research, 3344 N. Cherry Ave., Tucson, Ariz.*

Centrifugal Pumps

Handy Guide to Selection of Centrifugal Pumps offers 16 fact-packed pages. Pump types included in coverage are Electrifugal, close-coupled, pedestal, multi-stage, coolant and circulating, solids-handling, rubber-lined and sewage types. — *Allis-Chalmers Mfg. Co., Milwaukee 1.*

Synchronous Generators

High-speed Tri-Clad synchronous generators are treated in 4-page Bulletin GEA-5470. Ratings are from 1.875 to 50 kva for standby, portable, and prime-source power.—*General Electric Co., Schenectady 5, N. Y.*

Rotary Heat Sealers

Two combinations of rotary heat sealers—hole-punch device and code-dater, and hole-punch device and compression unit—are illustrated in 6-page folder.—*Doughboy Industries, Inc., New Richmond, Wis.*

Bakery Machinery

Complete line of bakery machinery and ovens, as well as sanitary make-up equipment, is pictured and described in 16-page catalog.—*American Machine & Foundry Co., New York 17.*

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Food Processing Equipment
Twenty four-page large-format booklet gives general description of varied line of food processing equipment.—*Food Machinery & Chemical Corp., San Jose 6, Calif.*

Rotary Compressors
Diagrams and photos in 4-page Bulletin C-4 show construction of rotary compressors and vacuum pumps.—*Fuller Co., Catasauqua, Pa.*

Control Equipment

Industrial Controls
Over 100 models of non-indicating electric, electronic, and pneumatic controllers for temperature, flow, pressure, liquid level and humidity measurements are diagrammed and specified in 60-page Catalog 8304.—*Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44.*

Process Controls
Eight-page Bulletin 17-C illustrates process controllers, control components, control systems, and measuring components. — *Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10.*

Water Deaerators, Softeners
Good schematic diagrams feature 6-page Bulletin 103 on water heaters, deaerators and hot process softeners.—*Belco Industrial Equipment Div., Paterson 3, N. J.*

Control Equipment
Catalog 50-1, 12 pages, pictures and describes complete line of control instruments and systems, regulating valves and desuperheaters.—*Republic Flow Meters Co., 2252 Diversey Pkwy., Chicago 47.*

Liquid Density Measurement
Specific gravity liquid density measuring device, Densitrol, features totally submerged plummet with direct reading scale. All details are in 8-page Bulletin W-2. —*Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia 30.*

Water Level Gages
Float, pressure bulb, pressure, counterpoise, differential pressure and air-bubbler types of liquid level gages are described in 24-page Bulletin L700.—*The Bristol Co., Waterbury 20, Conn.*

Spectrophotometer
Operation of Model B spectrophotometer, termed economically priced instrument designed for rapid routine measurements, is particularized in 8-page Bulletin 210-B. — *Beckman Instruments Inc., S. Pasadena, Calif.*

Magnetic Separators
Capacities and dimensions of non-electric permanent magnetic separators for tramp iron removal are recorded in Catalog 14.—*The Eriez Mfg. Co., Erie, Pa.*

Deaerating Heaters
Bulletin 2357, 20 pages, contains complete description of spray-type deaerating heaters. Special section offering case histories shows operation advantages.—*The Permutit Co., 330 W. 42 St., New York 18.*

Materials Handling

Materials Handling Line
Comprehensive 44-page catalog pictures and specifies following materials handling equipment: Gas and electric fork lift trucks, motorized hand trucks, hand lift trucks, and hand and electric hoists.—*Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15.*

Aluminum In Materials Handling
Collection of seven feature articles on how lightweight aluminum saves manpower and costs in materials handling makes up 16-page booklet.—*The Aluminum Assn., 420 Lexington Ave., New York 17.*

Fork Lift Trucks
Practical data on fork lift trucks, tractors, and electric pallet trucks are tabulated in 4-page Specifications Folder.—*Towmotor Corp., 1226 E. 152 St., Cleveland 10.*

New Conveyor Chain
Known as the Rex Flex Top, new conveyor chain can flex in horizontal and vertical planes, and curve around corners with ease. Intended advantage is, of course, elimination of need for transfer of containers from one conveyor to another. Chain is described in 4-page Bulletin 51-59.—*Chain Belt Co., 1600 W. Bruce St., Milwaukee 4.*

Straddle Trucks
Complete dimensions and diagrams on straddle trucks with capacities from 18,000 to 30,000 lb. capacity are set forth in 16-page booklet.—*Hyster Co., 1800 N. Adams St., Peoria 1, Ill.*

Floor-Type Conveyors
Useful engineering data and specifications for chain-on-flat and chain-on-edge floor conveyors are presented in 90-page Catalog 51. Also shown are typical ends, turns, curves, inclines and declines.—*Jervis B. Webb Co., Detroit.*

Refrigerator Railroad Car
The radical new refrigerator railroad car — Unicel — is completely described in 32-page booklet. Reported lighter and more durable, it is designed to carry a bigger pay load than standard freight cars.—*Pressed Steel Car Co., Chicago.*

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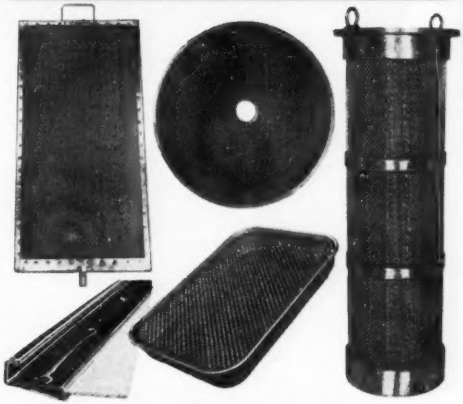

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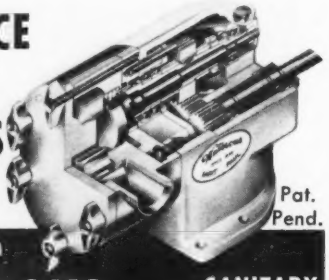

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Flexible Metal Hose

Sixty-eight-page Catalog G-50R specifies and illustrates line of flexible metal hose, bellows and expansion joints. One outstanding item is a galvanized steel conveyor fully interlocked with integral strip inner liner available in sizes 2½ to 8 in. ID.—*Chicago Metal Hose Corp., Maywood, Ill.*

Valves, Gages

Liquid level gages, valves and other specialties are shown in 4-page folder.—*Jerguson Gage & Valve Co., 87 Wellsway, Somerville 45, Mass.*

Mechanical Packings

Simplified recommendation chart is feature of 32-page catalog on self-forming, self-lubricating and self-sealing process packings.—*Flexrock Co., Filbert & Cuthbert Sts., Philadelphia 4.*

Welding Electrodes

Recommended welding technics and procedures, also machining suggestions, for line of bronze electrodes are provided in 24-page Bulletin W-17. Selection charts are included.—*Ampco Metal, Inc., 1745 S. 38 St., Milwaukee 46.*

Colored Industrial Tapes

Fifteen color varieties of industrial pressure-sensitive tapes are shown in novel folder that gives quick reference to types through die-cut apertures. Tapes include: Plastic, filament-reinforced, cellophane, acetate fiber, and film laminate.—*Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.*

Flavorings, Essential Oils

Wholesale price list covering variety of flavoring, aromatic and essential oil materials is offered in 28-page catalog. Where-to-use charts are included.—*Florasynth Laboratories Inc., 1513 Olmstead Ave., New York 61.*

Peroxygen Compounds

Modification of Starches, Proteins and Gums With Peroxygen Compounds is title of 16-page Data Sheet SPG-1. Practical examples, various suggestions and literature references are given.—*Becco Sales Corp., Station B, Buffalo 7, N. Y.*

Protective Boiler Coating

Apexior Number 1, a protective coating for boilers and other equipment in wet-heat service, is fully described in Bulletin 1530.—*The Dampney Co. of America, Hyde Park, Boston 36.*

Electronic Air Cleaner

The Precipitron electronic air cleaner is described in non-technical language in 8-page Leaflet SA-6691.—*Westinghouse Electric Corp., 200 Readville St., Hyde Park, Boston 36.*

Miscellaneous

Food Plant Sanitation

Well-illustrated 12-page brochure explains the Excelcide system of food plant sanitation. Particular emphasis is given insect and rodent control.—*Huge Co., 884 Hodiamont Ave., St. Louis.*

Brewing Course

Calendar and curriculum of 1951-52 course in brewing technology is offered by—*Siebel Institute of Brewing Technology, 741-747 W. Jackson Blvd., Chicago 6.*

Roof Maintenance

Food plant men responsible for roof maintenance should find 32-page brochure helpful. Illustrated by drawings and photos, it provides practical knowledge on roofs.—*Tremco Mfg. Co., 8701 Kinsman Rd., Cleveland.*

Precision Bulk Salting

Discussed in 8-page Bulletin 304 are two important food industry subjects: Dry salt vs. tablet usage; and simplified, uniform dispensing. There are cost comparison charts.—*Morton Salt Co., Industrial Div., Chicago 3.*

Office Calculators

Two 12-page bulletins, *Facts About Office Figures* and *The Printing Calculator*, describe office calculators that multiply directly, divide automatically, add and subtract, and print proof on tape.—*Remington Rand Inc., 315 Fourth Ave., New York 10.*

Use of Terramycin

Specific descriptions of the effects of terramycin, aureomycin, streptomycin and penicillin on the growth and livability of poultry and swine are compiled in 30-page brochure, titled *Bi-Con Feed Supplements.*—*Chas. Pfizer & Co., 630 Flushing Ave., Brooklyn 6, N. Y.*

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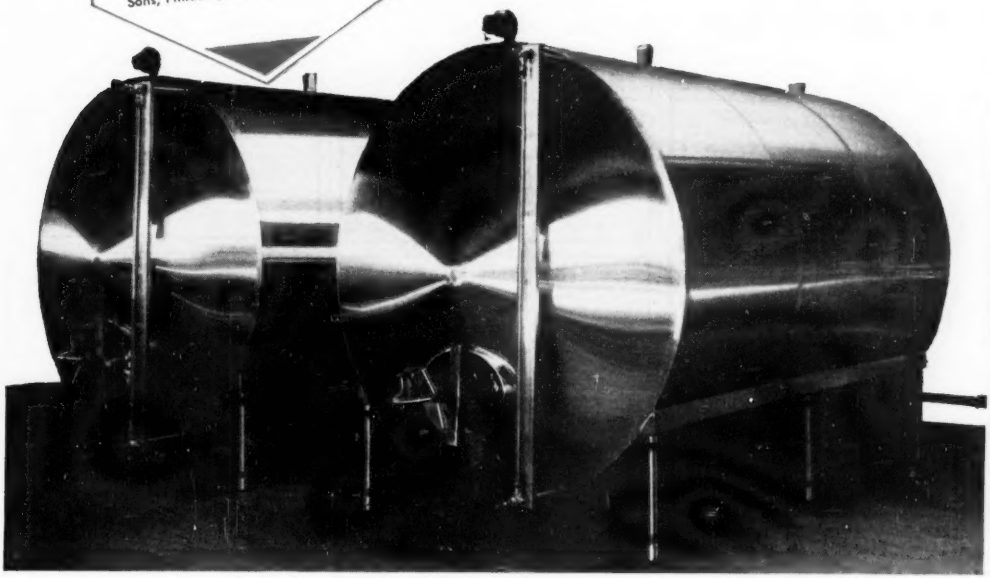

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PRODUCTION MANAGER. 30 years experience in the manufacture of jellies, preserves, spreads, pie fillings, fudge base, glacé fruit, flavors and specialties. Also products for grocers, confectioners, and institutional supplies. Capable of taking full charge. PW-9492, Food Engineering.

SPECIALIST CANNED fish and sea foods, pickles and spices, research and production control. PW-9410, Food Engineering.

PLANT MANAGER: wants position with small or medium size plant on West Coast, salary secondary. Experienced, Jams, jellies, mayonnaise, syrups, Canned fruits, meats, vegetables, poultry and other specialties. Over 20 years experience. PW-9521, Food Engineering.

PLANT MANAGER, manufacturing olives, pickles, peanut butter, mayonnaise, jams, jellies, syrups, extracts, mustard, etc. Capable of starting from scratch or add to your present lines, also sales. PW-9591, Food Engineering.

PATENTS

Consult: Z. H. Polachek.
Reg. Patent Attorney, 1234 Broadway, New York 1, N. Y.

DISTRIBUTORSHIP WANTED

Financially responsible and well established wholesale-distributor of fresh produce located 40 miles west of Chicago, seeks opportunity to distribute additional lines. Prefer exclusive franchise basis. Warehouse floor space approximately 19,000 sq. ft.; have refrigerated rooms. Also, private railroad siding adjacent to building; loading platform can accommodate three cars. At present operate eight trucks to cover city and area within 40 mile radius servicing retail food stores, restaurants, and institutions. Will consider any item or product. Additional information upon request.

RA-9550, Food Engineering
520 N. Michigan Ave., Chicago 11, Ill.

COURSES IN FOOD TECHNOLOGY

a. Mathematics and Chemistry of Food Technology
b. Food Analysis
c. Nutrition
d. Canning
e. Freezing
f. Preserving
g. Inspection and Grading according to USDA standards
h. Mold Counting and Insect Examination

RESTAURANT MANAGEMENT
GENERAL STUDY OF COOKING
PREPARATION OF SALADS
PIE AND PASTRY MAKING
CAKE DECORATING
STUDY OF MEATS

MEN OR WOMEN
VETERANS OR NON-VETERANS
DAY AND NIGHT CLASSES

Highly qualified instructors with practical experience as well as European and American degrees in their respective fields.

ATTENTION EMPLOYERS

If you need qualified personnel, such as: Food Technologists, Laboratory Technicians, Mold Counters, Foremen, Foreladies, Graders and other trained personnel for Quality Control Work please contact the Employment Office of the school.

MIAMI SCHOOL FOR FOOD PROCESSING SPECIALISTS

Box 383 CORAL GABLES 34, FLORIDA
Telephone: 83-1301

WANTED

(Additional Wanted Advertising on page 222)

WANTED

Large engineering firm wishes to acquire several complete food plants through purchase of (1) capital stock, (2) assets, (3) machinery and equipment, whole or in part. Personnel retained where possible; strictest confidence.

Box 1219, 1474 Broadway, N. Y. 18, N. Y.

Business Opportunity Advertising—Page 222

SHIPMENT FROM STOCK

AGITATOR
Patterson, vert., Unipower w/motor.

AGITATOR DRIVES
All sizes and types. Write for list.

AIR CONDITIONING UNIT
5 ton, Carrier.

BATCH MIXERS—75 lb. cap.

BLENDERS
Sturtevant 8A, 157 cu. ft., steel (2 NEW).
Conical, copper, 20", 2.7 cu. ft. (3).

DRYERS
Devine, rotary drum, 60"x126".
Devine, vac., #11, shelf, CI, 170 sq. ft.
Buflovak, drum, 24"x20", SS & aluminum.
#11, Laboratory Spray, SS.

FILTERS
Oliver, 8'x10', 250 sq. ft., wood & steel.
Sweetland, size 12, steel, 72 leaves.

KETTLES
40 gal., SS, jackt'd. (8).
1,100 gal., steel, jack'td., 250# PSI.
1,800 gal., SS clad, jack'td., 100 PSI.
2,000 gal., steel, jackt'd., 200 PSI.

MIXERS
#3 Super Ajax, 3 bbls.
Type E-2 Champion, 2 bbls.
Dough Mixers, Readco, 1½ bbls.
Paddle, double shaft, 1050 gals. (NEW).
Alpha, double screw, 240 cu. ft. (NEW).

PRESSES—TABLET
Colton, rotary, type 200 RP (3).
Colton, rotary, type 2 RP.
Colton, pelleting, type 3-DT (9).

PUMPS
Economy, sump, 2½ VSL (8 NEW).

TANKS
480 gal., 4'x5', vert. wood (NEW).
2300 gal., 5'x17'x¼", SS.
3000 gal., 5'x21'x¼", type 430 SS.

TANK CAR TANKS
6500 gal. steel, 76" ID, 27'10" overall, 11/16" & 5/16" shell, 5/16" head (Quant.)

TOWERS
24"x94", rubber lined.
36"x11', Haveg.
20"x63", steel.

WAX WRAPPING MACHINE—Model N4.

WEIGHING MACHINE—Automatic, Mod. NP

ABOVE IS ONLY PARTIAL LISTING OF OUR EQUIPMENT

HEAT & POWER CO., INC.
70 Pine St., N. Y. 5 • Digby 8-0373

FOR SALE
24 MM caps FDNK Tinplate Black outside, White inside.
Price—$2.73 per M F.O.B. Lafayette, Louisiana
THE LE BLANC CORP.
Lafayette, La.

WHERE TO STORE FROZEN FOODS

QUAKER CITY COLD STORAGE CO
PHILADELPHIA, PA
3 WAREHOUSES
Proper Temperature for Frozen Foods

FOR SALE
FLOUR or FEED MILL
AT A BARGAIN PRICE

A Modern, 5-story, fireproof, concrete and steel mill completely equipped for 1200 CWTS daily flour capacity. Ample space to manufacture several hundred tons feed daily. Large inside concrete bins for bulk handling. All steel legs, conveyors and spouting. Latest grain cleaning and handling equipment. Recently wired to distribute electrical power to every floor. 400 Horsepower electrical motor capacity—mostly new. Large tract of land with 1000 feet private siding serviced twice daily by two great Eastern Railroads. Mill and 2 large warehouse buildings on siding.

This is a going operation—in a small town where wages are very attractive and where labor relations are entirely a company affair. Highly skilled milling, laboratory, traffic and management personnel now employed and available. Aggressive and experienced sales force.

Consider These Freight Advantages

Ideally located in the East to serve all principal markets from Cleveland Eastward—at lowest possible rates. EX-LAKE AND RAIL Transit established for all Northwestern and Southwestern grains. Several million bushels local grains raised annually with no other milling outlet. Excellent export rates all Eastern ports.

BO-9506, Food Engineering
330 W. 42 St., New York 18, N. Y.

WANTED
WATERFRONT PROPERTY
approximately 40,000 square feet of floor space. Must be in Rhode Island or Connecticut for frozen foods operation.
W-9615, Food Engineering
330 W. 42 St., New York 18, N. Y.

WANTED
DRY SPRAYING PLANT
Will buy equipment or lease plant.
W-9614, Food Engineering
330 W. 42 St., New York 18, N. Y.

SALE
2 U. S. Bacon Slicers—Model No. 3 . $1600.00 each
1 U. S. Bacon Slicer—Model No. 3 . 2000.00
1 Bacon Conveyor Table 13" 9" x 3" 8"
S. S. Top with 12" S. S. Motor Driven Belt . 700.00
Can be inspected in Philadelphia.
Offered as is, where is, subject to prior sale.
FS-9670, Food Engineering
330 W. 42 St., New York 18, N. Y.

SALE
Pneumatic Scale Co., Automatic Cartoning Line Feeder, Bottom Sealer, Liner, Filler, Top Sealer & Compression Unit. 30 per minute.
Can be inspected in Philadelphia
Offered as is, where is, subject to prior sale
Asking Price $5000.00
FS-9672, Food Engineering
330 W. 42 St., New York 18, N. Y.

WANTED

WANTED
Used 50 Gallon STAINLESS STEEL DRUMS
Any quantity will be bought by
COTT BEVERAGE CORPORATION
P. O. Box 1901 New Haven, Connecticut

ABC AUTOMATIC CASE UNLOADER

for unloading new bottles. Currently set up to handle 24 twelve-ounce tall non-returnable beer bottles. Can be adjusted to unload other sizes and shapes of bottles. For full details address L. J. Strickland.

Brewing Corp. of America
9400 Quincy Avenue
Cleveland 6, Ohio

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- Want or Offer **USED EQUIPMENT?**
- Need competent **PERSONNEL?**
- Want or Offer a **BUSINESS OPPORTUNITY?**

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SEARCHLIGHT SECTION
of
FOOD ENGINEERING

Guaranteed Rebuilt Process Machinery

UNION Rebuilt Machinery Established 1912

Still Available At Real Bargain Prices

JUST SECURED

International S.S. Straightline 160/min. Vacuum Filler.

Resina S and LC Auto. Cappers.

New Way Wraparound Labeler.

Day and Robinson 100, 1000, 2400 lbs. Dry Powder Mixers and Sifters.

J. H. Day 35 and 75 gal. Imperial Double Arm Steam Jacketed Mixers.

Day, Ross Pony Mixers; 8, 15, 40 gal. caps.

B-P type 3500 gal. S. J. Double Arm Mixer.

F. J. Stokes, J. H. Day, New Era, Hottman Mixers, from 2 gallons up to 450 gallons, with and without Jackets, Single and Double Arm Agitators.

Baker Perkins BB, JNM and Readco Heavy Duty 50 to 150 gal. Double Arm Jacketed Mixers, Sigma or Fish Tail Blades.

Baker Perkins 200 gal. Unidor S. J. D. A. Mixer.

Mikro 4TH, 2TH, 1SH, Bantam Pulverizers; Jay Bee, Schutz O'Neill, Stedman Mills.

Allis Chalmers Low Head and Great Western B4 Sifters.

Colton Rotary Tablet Machine.

Pony M, ML and MX Labelrites; Ermold and World Semi and Fully Automatic Rotary and Straightaway Labelers.

Burt Automatic Wraparound Labeler.

S & S GI and G2 Auger Fillers.

Whiz Packer B1, B2 Fillers.

Triangle Package Models G2C, G2S, A2C, N2CA and A6CA Elec-Tri-Pak Fillers.

Triangle SHA Filler and Carton Sealer.

Horix and Elgin S. S. Rotary Filler.

Filler 1, 2, 4 and 8 head Stainless Steel Automatic Piston Fillers, Rising Bed Feature.

Ayars Rotary Filler #10 Cans, etc.

Stokes 90D Auto. Tube Filler and Closer.

Stokes, Colton Tube Filler & Closer.

Amsco, Doughboy and Heat Seal-It 15D "Pacer" Auto. Cellophane Bag Sealers.

Standard Knapp No. 429 Carton Sealer.

Hayssen 3-7, Package Machinery Co. Models FA, DF, CA2; Miller & Scandia SFC and SSU1 Automatic Cellophane Wrappers.

Sweetland, Valles, Sperry, Shriver, Republic, Alsop and Ertel Filter Presses.

Huhn Steam & Gas-fired Rotary Dryers.

Pneumatic Scale Auto. Tite-Wrapper.

THIS IS ONLY A PARTIAL LIST OF EQUIPMENT AVAILABLE

OVER 5000 MACHINES IN STOCK—TELL US YOUR REQUIREMENTS

Union STANDARD EQUIPMENT CO.
318-322 LAFAYETTE ST., NEW YORK 12, N.Y.

TOP PRICES PAID FOR YOUR SURPLUS EQUIPMENT

Charles S. JACOBOWITZ Co.
1088 MAIN BUFFALO 14, N.Y. PHONE AMherst 2100

1,200,000 GALLONS GLASS LINED TANKS

FOR SALE

122 Pfaudler glass enamel lined tanks. Immediate delivery. Horizontal and vertical. Mostly 10'6" O.D. Complete with manholes, stands, all fittings. Tanks like new; warrants your inspection; offer subject to prior sale. Have complete listing. Tanks located Buffalo and New York.

The biggest sale of glass enamel lined tanks in our entire history!

Serving American Industry for over 25 Years

6,000 ALUMINUM TRAYS
New—$2.00 each
Can be nestled to any height.

DIMENSIONS:
Inside measurements: 17¼" x 2½"
Overall length: 22⅛"
Ends: 1½" deep with open sides

FS-9091, Food Industries
330 W. 42 St., New York 18, N. Y.

FOR SALE
PACKAGING & WRAPPING MACHINES

Two Fred Goat Packaging Machines fully automatic in good working order. Also Two Knap Wrap Cellophane Wrapping Machines and Two Jabez Burns 500 lb. Mixers.

H. H. HIXSON & CO., INC.
1218 N. Halsted St., Chicago, Illinois

EVEN IF IT ISN'T LISTED WE MAY HAVE IT. CONSULT US

Specials

1—Stainless Steel 18" Bubble Cap Column.
1—Shriver 42" C.I. Plate & Frame Filter Press, 26 ch's.
1—Sperry 42" Wood Plate & Frame Filter Press, 57 chs., Hyd. Closure.
1—Stainless Steel 75 gal. Jack. & Ag. Autoclave, 500# int. press. 125# Jack.
1—American Double Arm Atmospheric Dryer, 42" x 120".
1—Flaker 4' x 9'—Motor Drive.
1—Premier Type U-4 S.S. Mill, 20 H.P. 3 Ph. Motor.
1—W. & P. 100 gal. Stainless Steel Mixer.

We are interested in your surplus. Please send lists.

The Machinery and Equipment Corp.
533 West Broadway
New York 12, N. Y. GRamercy 5-6680

FOR SALE

100 qt. 6 speed Read Vertical Mixer
80 qt. 4 speed Hobart Vertical Mixer
No. 76 Enterprise Food Grinder, belt drive
Burns Peanut Roasters and Blanchers
No. 6 Royal Roaster, 75 lb. capacity
125, 200 and 250 lb. Nut Fryers
250 gallon Copper Steam Jacketed Kettle

SAVAGE BROS. CO.
2638 Gladys Ave. Chicago 12, Ill.

FOR SALE—MODERN PACKAGING EQUIPMENT

—LATE MODEL—

PNEUMATIC SCALE CO. 35 Per Minute.
AUTOMATIC CARTONING LINE
Automatic Feeder, Bottom Sealer, Liner, Filler, Top Sealer & Compression Unit.

PNEUMATIC High Speed Feeder & Bottom Sealer
PNEUMATIC SCALE CO. Medium size, Double Package Makers
PNEUMATIC 20 spout automatic Vacuum Filler
PNEUMATIC SCALE CO. Tightwraps
PNEUMATIC SCALE CO. Inner Liners, large & small sizes
PNEUMATIC 4 scale Net Weight Filler
PNEUMATIC Automatic 4 Head Capper
PNEUMATIC Single Head Automatic Capper
PNEUMATIC Air Bottle Cleaner
CAPEM 4 Head Automatic Capper
RESINA Automatic Cappers, 1 and 2 Head
FILLER MACHINE CO. 2 and 4 spout Stainless Steel Piston Fillers
LEHMAN Automatic Bag Filler
TRIANGLE 3 station Elec-Tri-Pak Filler Model G2C with feed hopper, stainless steel
KARL KIEFER Rotary Vacuum Filler, 12 spout stainless steel
PNEUMATIC SCALE CO. Simplex Labeler
PACKOMATIC Cartoning Unit, 8" and 12" sizes, Bottom Sealer, Filler and Top Sealer
STOKES & SMITH Model G Auger Fillers
DRIVER 2 Scale Net Weight Filler
CECO 12" Adjustable Top & Bottom Carton Sealer
STANDARD-KNAPP 429 Top & Bottom Case Sealer
FRED GROAT Check Weighers
WORLD fully automatic Straightaway Labelers
WORLD Automatic Rotary Labeler
STANDARD-KNAPP, BURT Can Labelers
NATIONAL, WORLD, ERMOLD Spot Labelers
POWDER MIXERS & SIFTERS 200 to 1000 lbs.
PROCTOR & SCHWARTZ 14 Tray Shelf Dryer
COLTON Tablet Machines, Model 3DT
LEHMAN 12"x24" 3 Roller Granite Mill

—WANTED—
Single Machine or Entire Plants

ALLIED EQUIPMENT CO.
940-946 Nepperhan Ave., Yonkers 3, N. Y.
Phone: Yonkers 5-0442

LOOK TO "CONSOLIDATED"

If you're up against
MACHINERY SHORTAGES

1—H.P.M. Co. 300 Ton Curb Press, with steam pumps.
1—Mechanical 4'x16' jacketed Cooker.
1—Dopp 800 gal. closed jacketed agitated Kettle.
3—Steel 9500 gal. closed jacketed agitated Kettles.
2—400 gal. open s/s jacketed Kettles, 100# jacket pressure.
3—42" All Stainless Steel Centrifugals, Amer. T.&M. Co., each with s/s basket, curb, casing, shaft, unloader and 40 H.P. variable speed Slip Ring 3/60/440 v. 1200 rpm. motor with full controls. Suspended bottom discharge type. Now at Newark.
1—6'x50' Louisville welded shell Rotary Steam Tube Dryer, 2 rows, 54 tubes.
8—Oliver Vacuum Filters, incl. 8x12', 11'6x14', 11'6x18'.
1—8'x12' All Stainless Steel Feinc Rotary Continuous Vacuum Filter, string discharge, with blankets and Stainless Steel trough, repulper, receivers, vacuum pump, motors, reducers, etc. Shop #387.
1—4'x30' Stainless Steel lined Rotary Dryer, with reducer and 10 H.P. motor.
1—18"x28" Bird Continuous Centrifugal Stainless Steel, copper housing, with 10 H.P. motor.
4—Swenson-Walker Jacketed Crystallizers in 10' sections, (1—70' lo. and 3—80' lo. each with pulley driven gear reducer and 10 H.P. A.C. motor). Units are 24" I.D. x 26" high with ¾" thick steel plate and ¼" steel jackets, steel covers and ribbon agitators.
2—Rotex Sifters, 40x84"; #11 20x48"; also 4—No. 71, 40x84" Roball All Stainless Steel.
2—Mikro Pulverizers, #1 with 7½ H.P. motor and #2 Type 2W at Newark.
15—Mixing Tanks; 15"x10'8", 12'x8'6", 10'x7', 10'x8' with steam coils and agitators; 6x5', 7x7' with agitators.
5—Day #71 Stainless Steel "Roball" Sifters, single deck, 40"x84, m.d. with 2 HP. 3/60/220 volt motors.
1—30"x30" Aluminum Filter Press; 45 chambers; 1" cake, side feed, open delivery, non-washing. Used on pectin.

ONLY A PA[illegible]

THE KEY TO SAVING TIME AND MONEY
PRODUCTS COMPANY, INC.
13-17 Park Row New York 7, N. Y.

We buy your idle machinery

FOR SALE

70—Stainless Steel and Stainless Clad Jacketed Kettles, 25, 30, 40, 60, 80, 100, 150, 200 gal.
12—Stainless Steel Tanks, type 316, 50, 80 & 300 gal.—closed.
1—100-gal. T347 Stainless Steel Pressure Tank, 250# Pr.
15—Horizontal Glass Lined Steel Sectional Brewery Tanks, 7500 gal. & 8250 gal.
14—Wood Tanks 4500 to 6000 gal.
6—Powder Mixers, 50#, 200#, 400#, 600#, 2400#, 5000#.
3—Mikro Pulverizers, Stainless Bantam, #1-F, #2-SI.
1—Fitzpatrick model "D" Comminuting Machine, Stainless Steel.
4—Selectro Stainless Steel Vibrating Screens, two-deck, 2' x 7', enclosed.
10—Rotary Pellet Presses, Stokes D-3 & D-4; Kux model 25.
1—Natl. Pkg. Mchy. Auto. Powder Filler, 2 spouts in tandem.
2—Triangle G-2-C Elec-Tri-Pak Weighers & Fillers.
1—Filler Mach. Co. 4-Piston Filler.
1—Elgin Auto. Twin Piston Filler, Stainless; Agit. hopper.
1—Elgin Auto. Twin Piston Filler, Monel; with 63-mm Capper. Unused.
2—Mojonnier #90 Rotary Vacuum Fillers, 14-spout; stainless.
1—International Auto. Vacuum Filler, 12 spout; stainless steel.
10—Filter Presses, 10" to 42".
2—Sweetland Filters, #2 & #5.
3—Ammonia Compressors, 9 x 9, 7½ x 7½, 6 x 6.
1—Deep Well Pump, 150 GPM-325' head. 20 HP motor. NEW.
3—Copper Beer Still Columns with condensers, etc. 18" dia. 24" dia. 30" dia.
6—Copper Bubble Cap Columns, 18" dia to 48" dia.
6—Aluminum Columns, bubble cap, etc.—24", 27" & 36" dia.

LIQUIDATING FORMER ALCOHOL PLANT

Capacity 1200 WG 190-proof alcohol per day.

Write for list.

PERRY EQUIPMENT CORP.
1511 W. THOMPSON ST. • PHILA. 21, PA.

FOR SALE

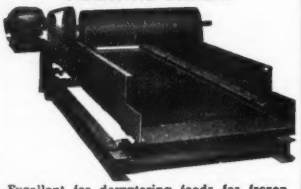
Evaporator: Swenson single effect, 400 sq. ft.
Viscolizers: 200 gal. Union stain. steel.
Powder Mixers: 100 to 2000 lb. capacities.
Tanks: Pfaudler 200 gal. glass lined, open top.
Screens: Rotex #11, 20, 42, Roball #32.
Colloid Mill: Charlotte M-15, stain. steel.
Kettles: Stain. Steel, all sizes, new and used.
Kettle: 60 gal. stain. steel, agitated.
Powder Fillers: Stokes & Smith, Stokes, Triangle, Gump, McMinn, Howes, Day.
Vacuum Drum Dryers: Buflovak 5' x 12'.
Fillers: Geyer, Kiefer Visco, M&S., Elgin.
Dicer: Sterling with 1 hp. motor.
Labelers: New Jersey, World, Knapp, Burt, Ermold.
Dough Mixers: 1-6 bbl., single, double arm.
Capper: Pneu. Scale 2-head automatic.
Vacuum Pan: 50 gal. copper jacketed.

Send us a list of your idle equipment.

LOEB EQUIPMENT SUPPLY CO.
1931 W. North Ave. Chicago 22, Ill.

QUALITY EQUIPMENT *FOR* FOOD PROCESSING

VIBRATING SCREENS



Excellent for dewatering foods for frozen packing, cannery wastes, sewage dewatering, sizing and grading of vegetables. Priced complete with stainless steel screen cloth from $479.00
Tomato and citrus juice processing screens.

CONVEYING EQUIPMENT

Belt and chain conveyors for picking and inspection; movement of cans, bottles, baskets, and cartons. Any length. Belt widths to 48".

Many other types, which can be integrated to make complete conveying systems. These include: floor to floor conveyors, bag and box stackers, etc. All are widely used in bottling plants, canning plants, warehouses, and factories.

MOTOR TRUCK SCALES

15 to 50 tons, complete with structural steel for weighbridge; priced from $545.00.

BONDED SCALE & MACHINE COMPANY
21 Bellview Columbus 7, Ohio

FOR SALE

Plate Heat Exchanger, 58 S.S. Plates.
100 gal. S.S. Clad Jkt. Kettles, 30"x52".
100 to 500 gal. S.S. Mix Tanks, water jkt.
350 gal. S.S. Tank 53"x36" with coil.
300 to 2000 gal. Glass Lined Tanks.
Buflovak S.S. Evaporator, 290 sq. ft.
2—Stainless Steel Coils, 3", 8 turns.
Premier Colloid (Paste) Mill, 7½ H.P.
125 to 1500 gal. Homogenizers or Viscolizers.
26" to 72" Stainless Steel Vacuum Pans.
Size B-3 Leiman Vacuum Pumps, 12.7 C.F.M.
Model 148C Stokes High Vacuum Pump, 1½ H.P.
Ingersoll-Rand Centrifugal Pumps, 5 & 7½ H. P.
50 ft. 2"x10" Roller Gravity Conveyor.
28"x60" to 42"x120" Double Drum Dryers.
Hobart Grinder, 1½ H.P.
J. E. Smith & Son Vanilla Bean Chopper.

Send us your inquiries

LESTER KEHOE MACHINERY CORP.
1 East 42nd Street, New York 17, N. Y.
Murray Hill 2-4616

FOR SALE

Brand new Whiz Packer Filling Machine Model B-3, floor model with auxiliary top hopper, New York location.

FS-9446, Food Engineering
330 W. 42 St., New York 18, N. Y.

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When knowing where to find what you need is the deciding factor between DELIVERY and DELAY . . . consult the advertising pages. If you do not find what you need . . . write

FOOD ENGINEERING

FLASH! "FIRST" cuts months to days!

Complete Equipment for Canneries from Retorts to Labellers, Casers etc.

Sterling Dicers, CRC Juice Extractors, Crushers, Pulpers, Finishers, Choppers.

Clarifiers, Centrifugals, Extractors, Heat Exchangers, Condensers, Coolers.

Your Surplus Equipment needed for Defense Work; send us your list.

More than ever TIME is Money . . . good used equipment available IMMEDIATELY, saves time and costs and in many cases steps up your production so that you do NOT have to pass up orders.

STAINLESS STEEL EQUIPMENT

NEW S.S. Jacketed Kettles from 50 gal. to 500 gal.
500 Gal. Jacketed Reactor in S.S.; 6'x30".
2 Stainless Spray Dryers; 6'x15' and 18'x52'.
Ball & Jewell No. 1½ Stainless Rotary Cutter; 30 HP.
Reitz 18" S.S. Disintegrator with 30 HP.
2 Hormann S.S. Pressure Filters; 24"x41".
Langesenkamp S.S. Model B EZAdjust Pulper.
S.S. Jacketed Vacuum Evaporator; 3'6"x6'.
Pfaudler 500 Gal. S.S. Agitated Tank.

Dehydrators, Dryers, Ovens, Evaporators, Reactors and Vacuum Pans.

Filters and Filter Presses by Shriver, Sperry, Niagara, Oliver etc.

Sifters by J. H. Day and Orville Simpson; Rotex and Roball; 20"x 48" to 40"x120".

If we do not list the equipment YOU need please ask for it; FMC can supply it.

FIRST MACHINERY CORP.

157 HUDSON ST. WOrth 4-5900 NEW YORK 13, N. Y.

IMMEDIATE DELIVERY

New Island Equipment Unscrambler
2—Hormann, 316 S.S. pressure leaf Filters with 20-24" dia. leaves. Like new.
Standard-Knapp #429 Top and Bottom Carton Gluer and Sealer, with 15 ft. Compression Belt
2—Sharples Super-Decanters, 316, S.S.
4—Shriver Filter Presses, 12" Iron and S.S., 24" Iron, 12 Chambers, New.
Elgin 2 piston S.S. Filler, Like New.
Pfaudler King Rotary Juice Filler, S.S., 12 Spout adj. Like New.
Pneumatic Scale Duplex Labeller Front and Back, 5" Centers, with 1 HP Exp. Motor.
Pfaudler Steam Peeler, complete.
S.S. Tanks & Kettles in stock
Pneumatic Scale Duplex Labeler, Front & Back, with 1 HP exp. motor.

For BETTER BUYS and SERVICE
Phone SOuth 8-4451 - 9264 - 8782
You can BANK on the

EQUIPMENT CLEARING HOUSE, INC.
289-10th ST., BKLYN 15, N. Y.

—FOR SALE—

1—Gruendler Hammermill, Model 2, with 30 HP Motor.
1—Micro No. 2 TH Pulverizer.
1—Gedge-Gray-Blender. 96 cu. ft. Capacity.
1—Niagara Stainless Steel Filter, 146 sq. ft.
2—Blaw-Knox Jacketed Autoclaves with agitator, 300 and 500 gals.
2—Tolhurst Stainless Steel Suspended type Centrifuge, 40" Imperforated basket.
3—Louisville Rotary Steam Tube Dryers, 6' x 25'.

R. GELB & SONS, INC.
UNION, N.J.
Est. 1886 UNionville 2-4900

"Buy Brill"—Buy the Best

2—Oliver 8' x 10' Monel Rotary Vacuum Filters.
2—Elmco 3' x 1' Stainless Steel (316) Rotary Vacuum Filters.
1—Pfaudler 750 gal. Glass lined jacketed Reactor.
1—Proctor & Schwartz 7-section Conveyor Dryer.
2—Vallez #49 Filters, 736 sq. ft.
2—Steel Storage Tanks 10'0" x 25', 9' x 32'.
10—Horizontal Steel Pressure Tanks 3500, 8000, 10,000 & 12,500 gals. 200 PSI.
2—Link Belt Roto-Louvre Dryers 5'2" x 20', 2'7" x 8' Monel.
Black & Klawson 36" x 84" Atmospheric Double Drum Dryer.
9—Oliver 1' x 1', 5'4" x 8', 8' x 8', 8' x 12', 11'6" x 18.
4—Shriver 30", 24", 18", 12" P&F Filters.
1—Sperry 30" Aluminum P&F Filter Press.
2—#12 Sweetland Filters, 72 leaves.
1—#2 Sweetland Filter, Stainless Steel, 12 leaves.
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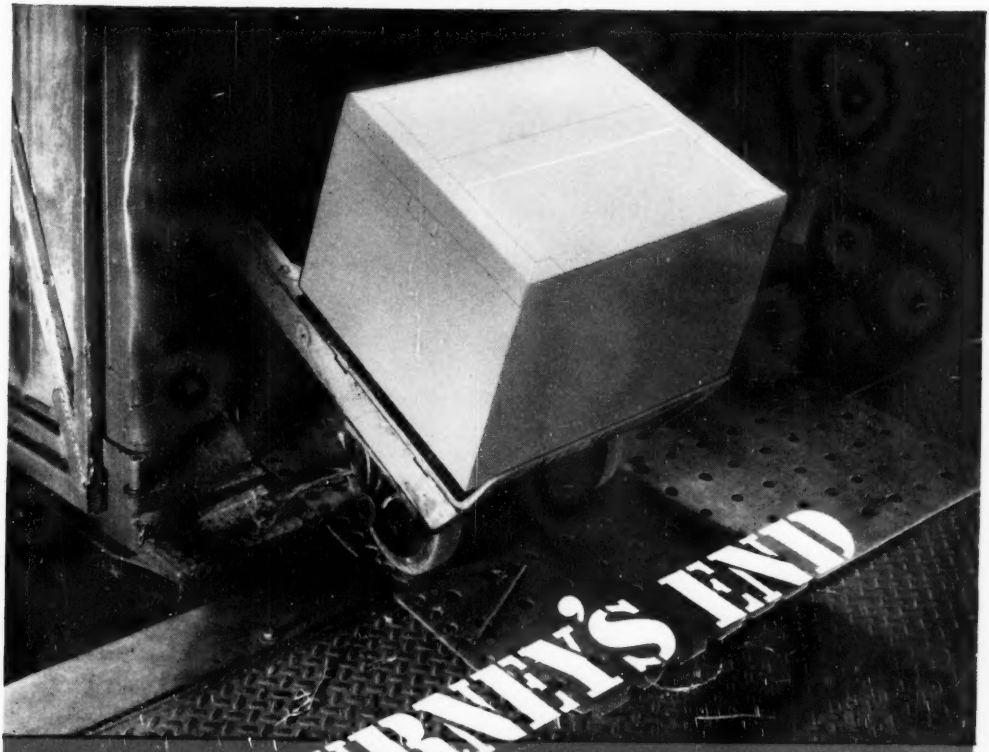

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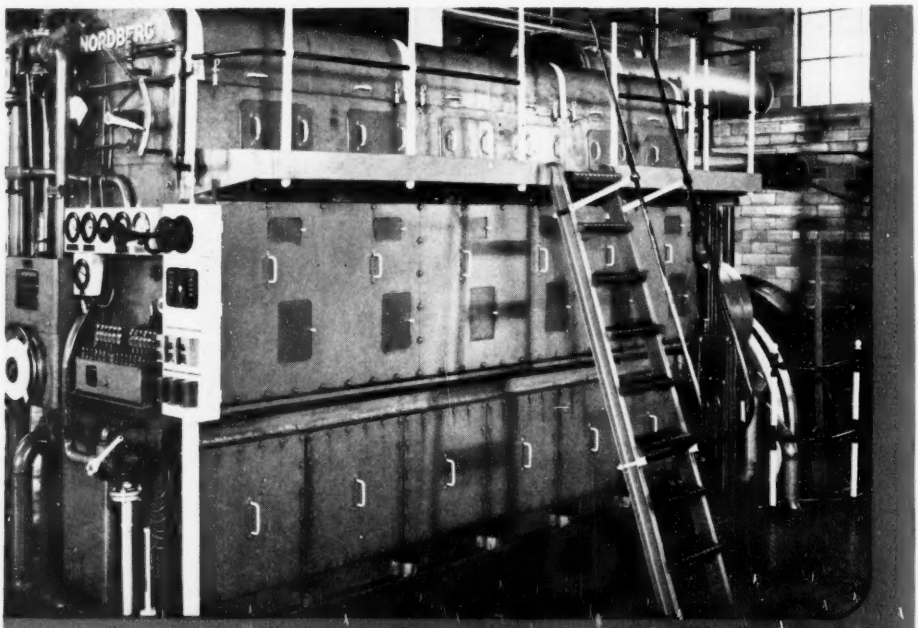

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